AUG 4 1930

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, August 2, 1930 | Issued Every Other Week | Volume XXXIII, No. 16

UNIVERSITY OF MICHIGAN

BY THE EDITOR

(This front cover has been reserved by the Editor as a fit frame for the most important announcement, in our belief, yet made by any publication to this industry.)

READERS:

Realizing that the need of the industry today is for information of practical help in making constantly better products at less cost, we have searched endlessly for such material.

The great need is for a thorough understanding of fundamentals. Our manufacturers and producers have been too busy increasing production for the last dozen years to study and appreciate some of the fundamentals—during which time the industry has been evolving from "rule-of-thumb" methods to methods of more and more exact scientific and instrumental control. More exacting specifications require it. Obviously the next few years will accentuate this evolution.

THE ROTARY KILN

The rotary kiln is the key to cement manufacture. It is less than 20% efficient. And so, with this issue we initiate a series of articles by one of the few chemical engineers in the world most capable of discussing the subject. "Researches on the Rotary Kiln in Cement Manufacture." For the first time, in any language, will appear a thorough, comprehensive, scientific treatment of the rotary kiln in theory and in practice.

AND INSTRUMENTATION

Concurrently with some of the chapters of this series will run another series of articles on "Instrumentation in the Rock Products Industry" by one of the foremost chemical and research authorities in America. Increases in efficiency of operation and quality of product must begin with some accurate measure of efficiency and precision of control.

Quarrying and Crushing

With the next issue we start a series of articles on quarry and crushing plant operation, by one of our own editors. This series is the result of many weeks' study and travels in the field. It is a critical study by an expert—written as we can not write when we visit and describe just a single plant. In other words, we have attempted to furnish our readers with constructive criticisms and suggestions that are based on *our own* extensive knowledge of the industry.

THE COST

These various series of articles will run into an added editorial investment by ROCK PRODUCTS of well over $10,000. We invest it cheerfully at a time when there is a tendency on the part of many to hedge on their expenditures. But we have unqualified faith in the future of the rock products industries and in our own journal. We consider that this is a good spending time. Never a better time for this journal, as *Agent* for the rock products industries, to use its resources of both brain and money in seeking just that fundamental kind of data that these articles do contain.

Faithfully,

Nathan C. Rockwood

Editor-Manager.

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Bethlehem Mines' Newest Crushed-Stone Plant

Additional Facilities at Steelton Operation Provide for Larger Tonnages of Flux, Aggregate and Sand

THE BETHLEHEM MINES CORP., Bethlehem, Penn., a subsidiary of the Bethlehem Steel Co., for many years operated a quarry and crushing plant at Steelton, Penn., which is approximately four miles southeast of Harrisburg, Penn. During 1929 the company built an entire new plant alongside the older one, designed not only to produce larger tonnages of steel furnace fluxing stone but commercial aggregates and dolomite sand as well. Another special product called "rice dolomite" is also produced here, used for lining and bottoms of open-hearth furnaces. This is a washed product of approximately ⅜-in. in size.

The new plant produces:

Sand—¼-in. and minus (washed).
No. 1—¼-in. to ⅝-in. (washed).
No. 2—⅝-in. to 1¼-in. (washed).
No. 3—⅝-in. to 2¾-in. (washed).
Flux stone—2¾ to 4-in. (dry screened).
Rice dolomite—minus ⅜-in. (washed).

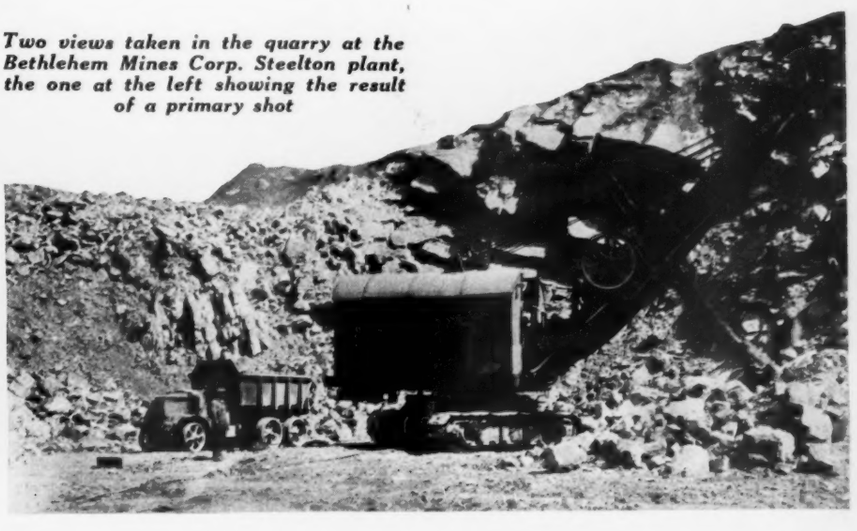
The quarry face shows a series of distinct series of stratifications of both high calcium and dolomitic limestones that rest at an angle of approximately 60 deg. The material from this face varies in composition; all of it, however, is highly suitable for commercial aggregate, but only portions of the quarry are of such grade that it is usable for flux and rice dolomite. Other parts of the face are only suitable for flux stone and cannot be used for rice dolomite.

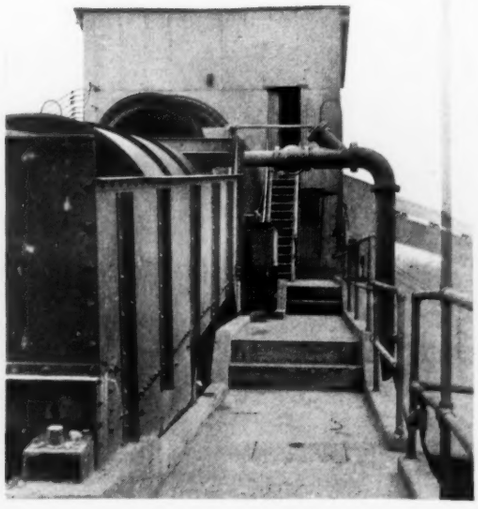
The size of stone used for furnace work referred to as flux stone includes the 2-in. to 6-in. stone. The fines, if not recrushed for rice dolomite, are re-screened and are the source of commercial stone and sand. In this respect the sizes of products produced at the Steelton plant are the same as those described in the July 6, 1929, issue of ROCK PRODUCTS in connection with the new Naginey, Penn., operation of the Bethlehem Mines Corp.

There are several feet of clay overburden, most of which is removed by dragline and

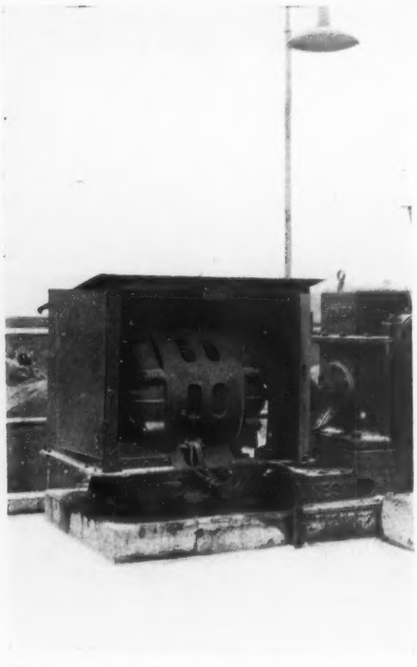
The uneven beach floor makes cribbing under the drills necessary

Two views taken in the quarry at the Bethlehem Mines Corp. Steelton plant, the one at the left showing the result of a primary shot





The washing and screening plant is mounted over concrete bins. At right is a closeup picture of the scrubber in background, and the rotary screen



Neat, all metal housings protect motors

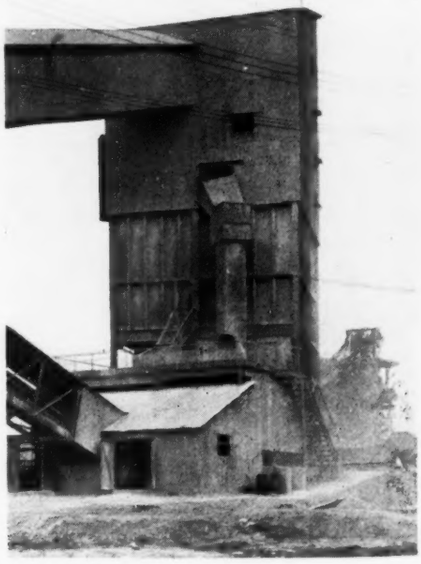
motor trucks, followed by teams and scrapers and the balance by hand methods. The unevenness of the top makes the use of power shovels for this work impracticable; even the churn drills have to be shored up by bulkheads of timber.

Three well drills are used for primary drilling and jackhammers for secondary drilling. The primary blast-holes, 6 in. diameter, are drilled 5 ft. below the quarry floor and are spaced on 15 ft. centers with a burden of 25 ft. Air for secondary drilling is supplied by a compressor that is belted to a 150-hp. motor. All electric power is 3-phase, 25-cycle. The compressor is part of the old quarry equipment, a 4-ft. by 8-ft. air receiver is used.

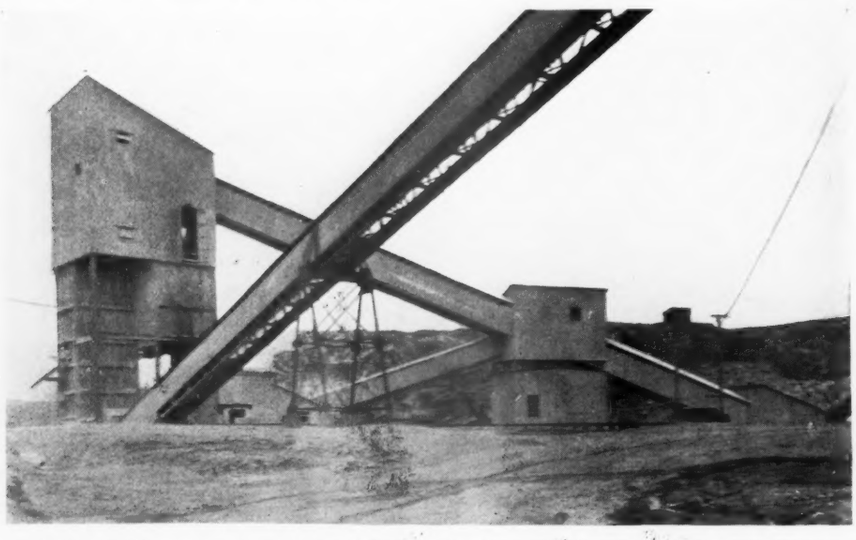
Dynamite is used for an explosive, the holes being loaded with either 60% or 40%, or both, according to the nature of the material to be shot at this particular site. The stratified nature of the deposit tends to give a highly shattered stone with a low powder cost.

Motor Trucks for Quarry Transportation

The face of the quarry, while irregular in outline, is roughly U-shaped, with the plant located in the open end. The distance around the rim of the quarry is roughly 4000 ft. with the average haul from the face to the primary crusher in the neighborhood of 850 ft. The face has an average height of approximately 85 ft. Conditions are ideal for using motor trucks for transportation, the floor is fairly level with no grades to overcome, and the distance is reasonably short; and so naturally the truck method of haulage was adopted. Three 7½-ton six-wheel solid rubber-tired trucks with rear-dump, 12-ton bodies have been used since the op-



The cylindrical, vertical chute mounted outside of the building serves one of the secondary crushers



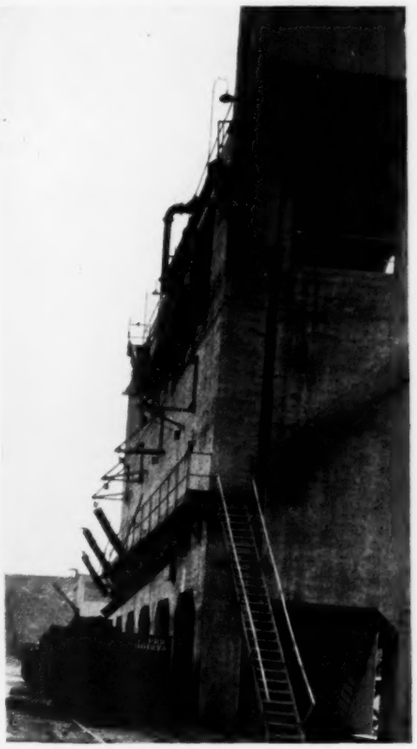
The Steelton conveyor system. Gallery in foreground serves washing plant

eration was started, with eminent success so far as operating costs are concerned. It is said that quarry transportation costs at this operation are lower than at any of the other five quarry operations of the Bethlehem Mines Corp.

All-Steel and Concrete Crushing Plant

The plant, the second new one to be built by this company in the past two years, was designed by the engineering department of the Bethlehem Mines Corp.

The buildings are all of steel and reinforced concrete construction throughout, with the dry crushing plant, conveyor galleries enclosed in corrugated iron. All walkways,



Loading commercial stone at the Steelton plant

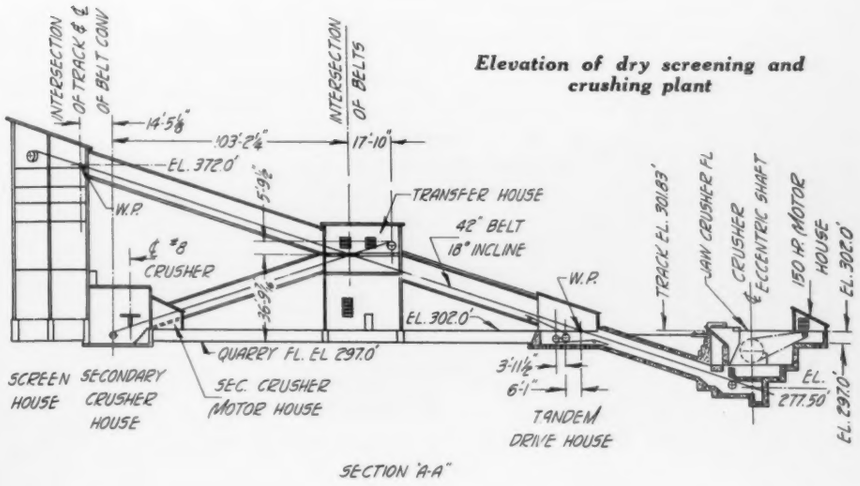
belts and stairs are well protected by suitable steel guard rails and heavy meshed wire cloth. The washing plant is not wholly enclosed, but no piece of equipment in that section, that would suffer due to the elements, is left exposed. The motors in such cases are protected by neat, all-metal "doghouses."

Combined Flux and Commercial Business

The plant is located so as to reach most of the city of Harrisburg by truck, and provisions have been made for loading and weighing such shipments. Flux stone and dolomite furnace lining are shipped to the company's steel plant at Steelton over standard-gage rails of the steel company, this distance being, roughly, one mile. Switching connection is provided with the Philadelphia and Reading and the Pennsylvania railroads for commercial aggregate shipments.

Another feature that makes this operation

Elevation of dry screening and crushing plant



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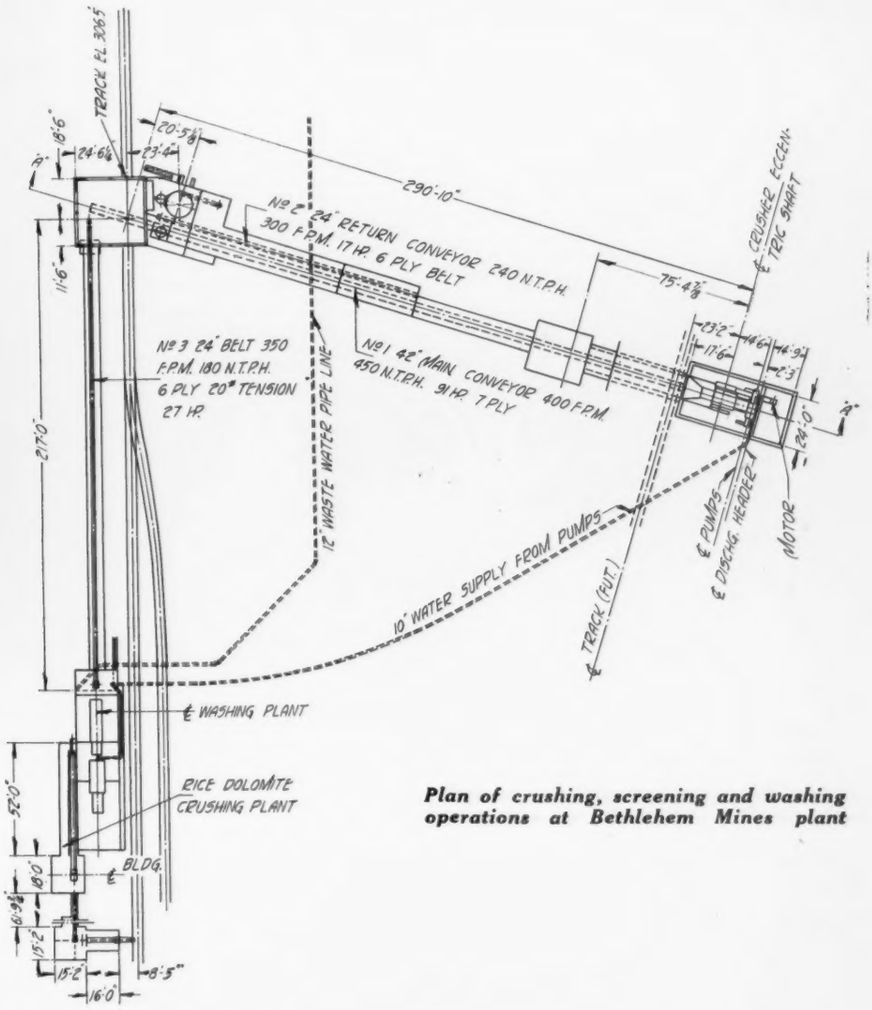
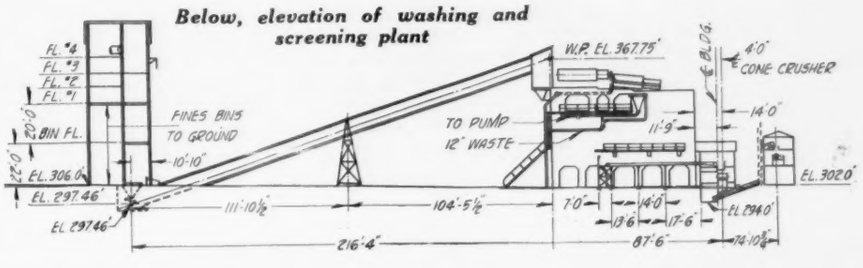
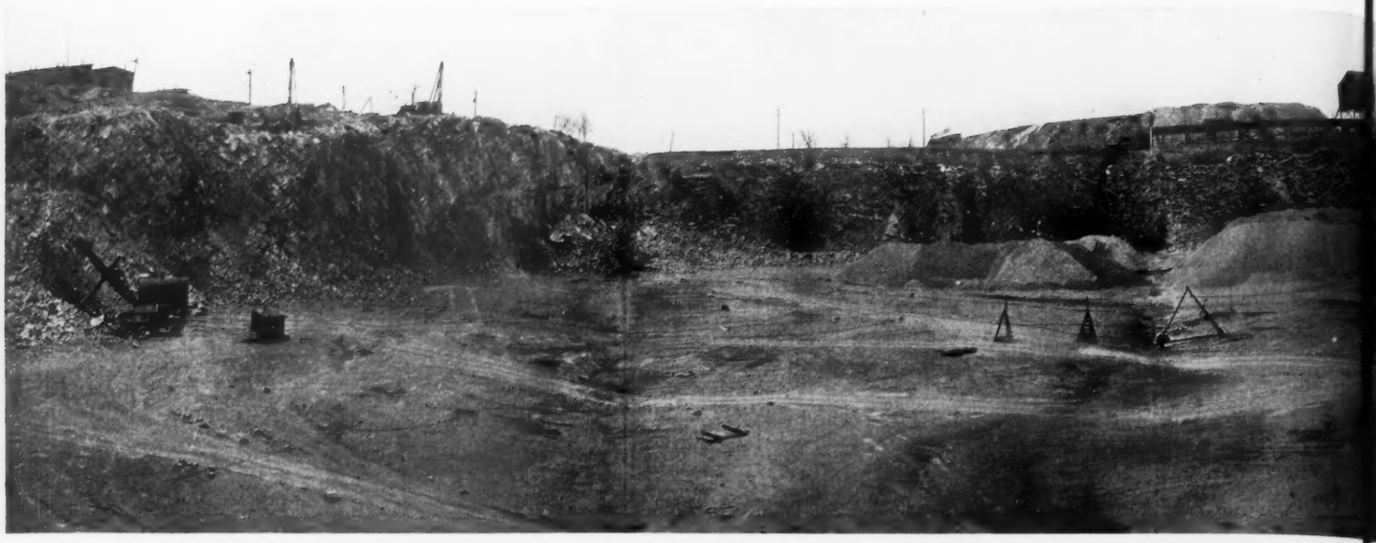


Plan of crushing, screening and washing operations at Bethlehem Mines plant

Below, elevation of washing and screening plant





A panoramic view of the Bethlehem Mines Corp. Steelton operation which shows quarry and plant. Lan... character o...

a low-cost one for the commercial aggregate is that during the dull periods of the year, when construction is at a low level, furnace dolomite and fluxing stone can be prepared and either stock-piled or shipped. Likewise, commercial aggregate can be stock-piled so as to maintain an equalized plant production throughout the year. Dolomite furnace lining, rice dolomite, is usually prepared two seasons per year in tonnage lots of 25,000 tons. Some 20,000 to 30,000 tons of flux stone are usually kept on hand and a similar amount of crushed stone. These products are all reclaimed by steam locomotive cranes.

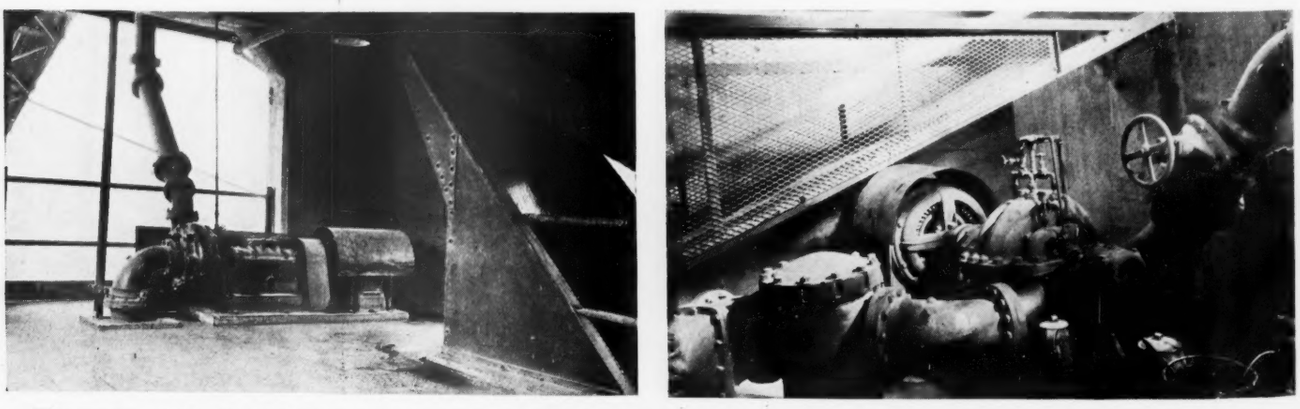
The muddy water from the washing plant settles and eventually is returned to the system through underground seepage

On a yearly basis, roughly 60% of the total production is at present going for furnace flux, 10% for furnace lining, and the balance for commercial stone.

Flux stone is not washed but is loaded direct to cars from a structural steel bin holding 250 tons. The gates for loading this material are of the top cut-off quadrant type, and are located in the bottoms of the bins, and are of special design by the Bethlehem Mines Corp. These gates are air-operated.

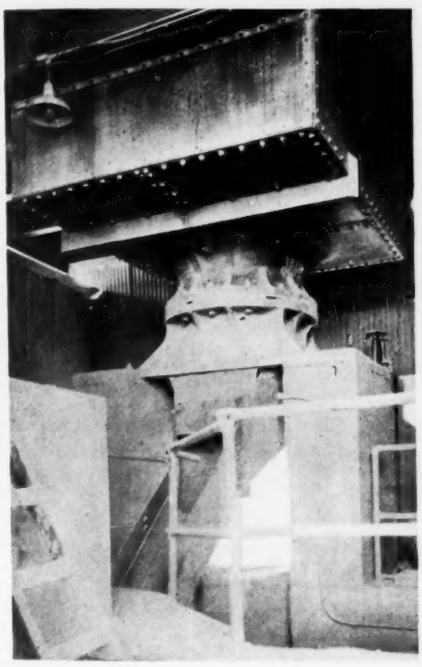
Washed Products

Commercial stone and rice dolomite are washed; the details of this operation will be described later in this article. Water for washing is secured from a well located near the primary crusher, with the two 8-in. centrifugal pumps, one direct-connected to a 75-hp. induction motor, and the other to a 50-hp. motor. The pumps are located in a shallow pit that contains the primary breaker, and have their 8-in. discharges en-



The pump at the left takes water from the classifying screens and returns it to the scrubbers. The one at the right is one of two pumps in the pit near the primary crusher

Level character of floor makes use of trucks for hauling rock from shovel both practical and economical



Novel construction of rectangular stone box over gyratory crusher

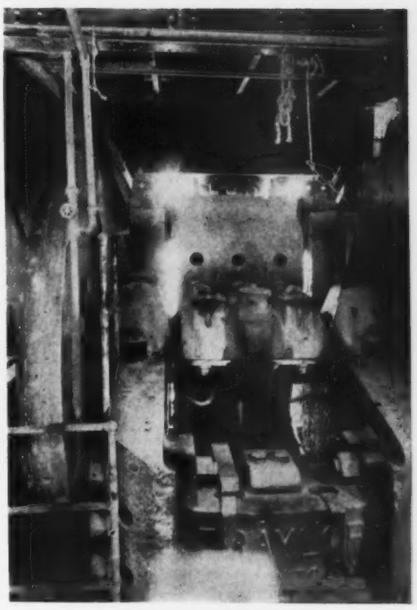
larged to 10 in., the size of the pipe that delivers to the washer some 350 ft. away.

Owing to the nearness of the quarry floor to the ground water levels and to its loosely stratified nature, plenty of water is available at all times. This condition permits a certain amount of the washing plant's waste water, when discharged by gravity to waste ponds located about 1500 ft. from the washer, to percolate back to the well and be used over again. These returning wash waters are free of all suspended matter.

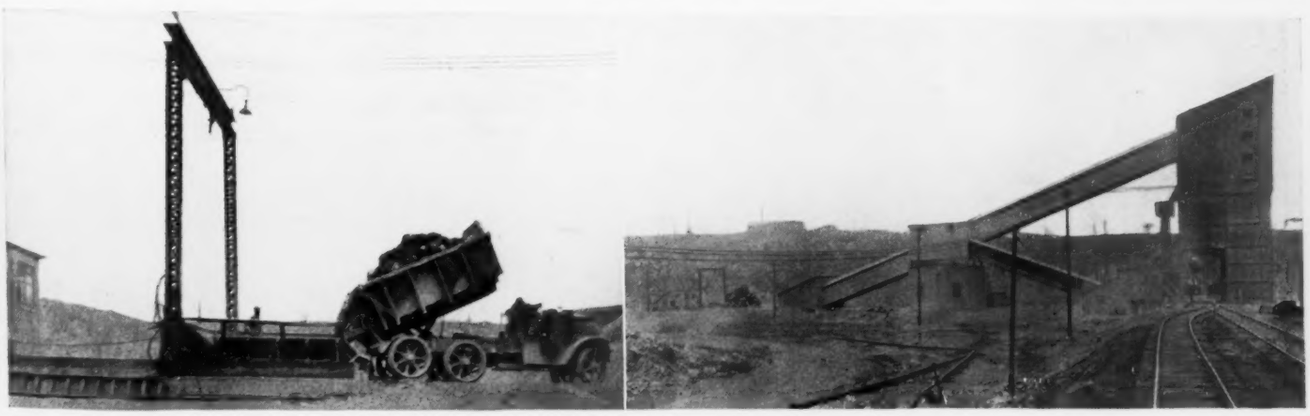
Quarry Operation

Loading is done by an electric shovel, mounted on crawler treads, using a 1¾-yd. dipper. The electric cable for the shovel is suspended on tripods for a distance of several hundred feet to about the center of the quarry. From this point 300 to 400 ft. of additional cable is necessary to reach the shovel, and this length simply lies on the quarry floor.

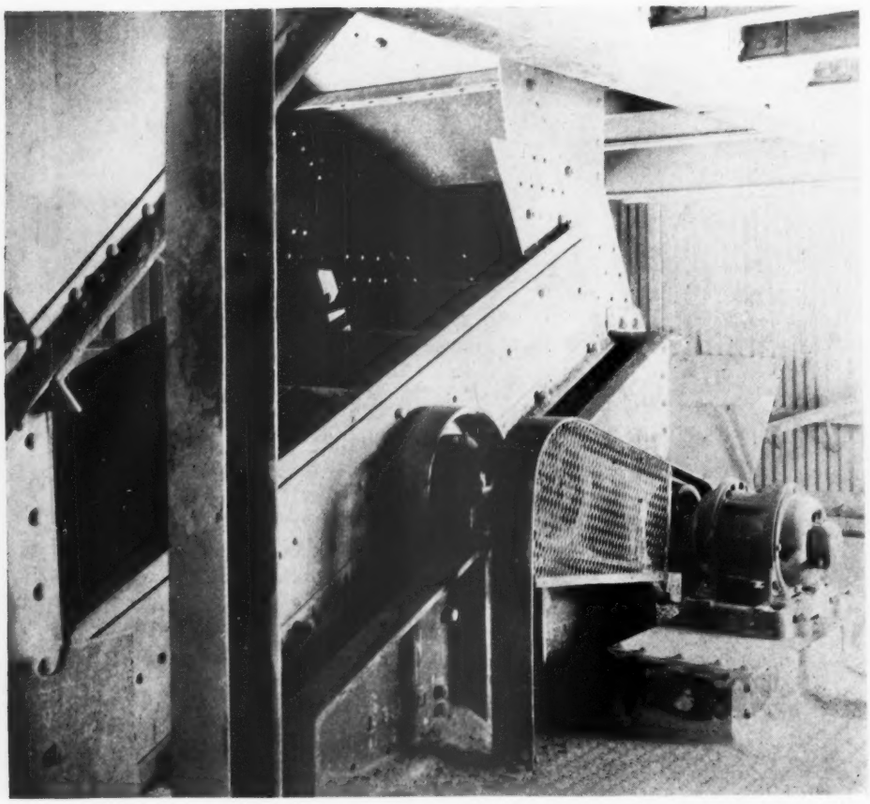
The one shovel easily loads on an average of 250 tons per hour to two trucks, the third being used as a reserve or for the longer hauls. The plant, however, has a capacity considerably in excess of this figure



The 48x60-in. jaw crusher at the Steelton plant



Dumping to the crusher feed hopper, at left. Note supports for chain block. At right is a side view of the dry screening and crushing plant. The washing plant is back of the large structure at the right



The vibrating screen is double-decked. Only one deck is used at present

and undoubtedly can produce 375 tons per hour when all the units are in balance.

Crushing Plant

The trucks, on arriving at the crusher, back up and discharge to a 48-in. by 60-in. Traylor jaw crusher, having a corrugated jaw and breaker plate set to deliver a 7-in. product. The crusher is belted to a 150-hp. 2200-volt motor by a 36-in. leather belt.

The 7-in. product from the jaw crusher is chuted direct to 42-in. inclined conveyor belt that delivers to the flux-stone screening plant. This belt has a center to center length of 315 ft. The belt is driven through a tandem drive, with gears running in oil, by a 60-hp. motor, whose drive and drive motor are located at approximately the quarry floor level, making inspection and maintenance an easy and simple matter. The idlers, head and tail pulleys, carrier and return rolls of this belt are all Alemite lubricated. It is equipped with a rotary brush scraper at the head pulley to clean the return portion of the belt. The head pulley is also provided with a non-reversible clutch for emergency stops. All the conveyor carrier rolls are spaced on 4-ft. centers and the return rolls on 10-ft. centers.

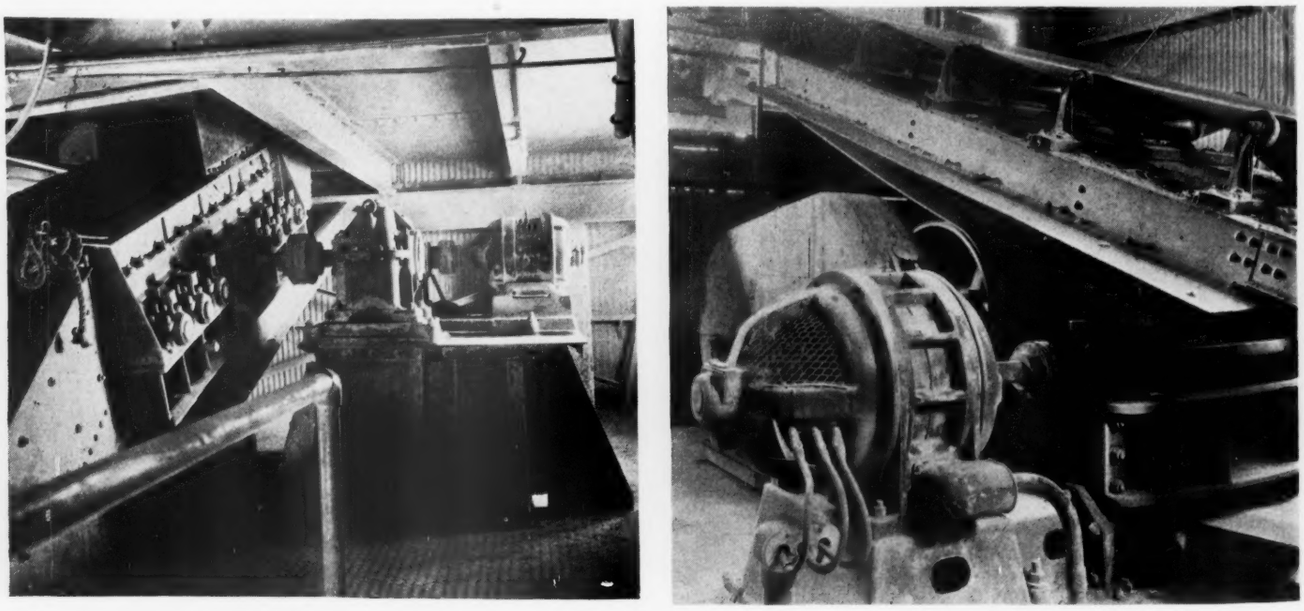
Screening Plant

The 42-in. belt discharges to a size 9-42-12 roll grizzly, whose rolls or tumblers revolve at 50 r.p.m. and are set to discharge a material that will all pass a 4-in. square opening. The grizzly is direct-connected to a 15-hp. induction motor through a spur-geared reduction unit. The speed reducer has a ratio of reduction of 14.4 to 1.

The fines from the roll grizzly fall to a 4-ft. by 8-ft. vibrating screen. The shaft of this screen revolves at 580 r.p.m. and is driven by a 5-hp. motor through a multiple-strand drive.

The vibrating screen is double-decked with only the lower deck used, and it is provided with a wire-cloth screen having 2-in. meshes. The oversize from the screen (minus 4 in. and plus 2 in.) is flux stone and falls to a bin below. The fines (minus 2-in.) from this vibrating screen fall to a separate bin, from which the stone is drawn and sent to the washing plant. This is the source of material for commercial aggregate and for rice dolomite.

The oversize from the roll grizzly falls to a 6-in. stationary grizzly, the oversize of which falls to a gyratory crusher. The velocity of the falling stone over these grizzly bars is retarded by a free swinging baffle of short lengths of steel rails suspended independently and vertically near the head end of the grizzly. The fines from the grizzly (plus 4-in., minus 6-in.) are chuted



Left, the cataract grizzly, the primary screening operation for securing flux stone. Right, motor and tandem drive on 42-in. belt which has a center-to-center length of 315 ft.

to a 6-in. gyratory crusher. Both crushers are set to deliver a 3½-in. product, which falls to a 24-in. inclined conveyor belt that elevates and conveys the product to a point where it is chuted back to the main 42-in. belt and is returned to the primary classification system.

The chute from the 6-in. stationary grizzly that serves the larger gyratory is of novel construction, being mounted vertically outside the main building, as shown in the accompanying illustrations.

The gyratory crusher is belted to a 100-hp. 2200-volt induction motor with a 14-in. belt.

The 6-in. gyratory is driven by a 10-in. belt from a 50-hp. 440-volt induction motor, and the 24-in. off-bearing conveyor is a 25-hp. induction motor through a spur-geared reduction unit.

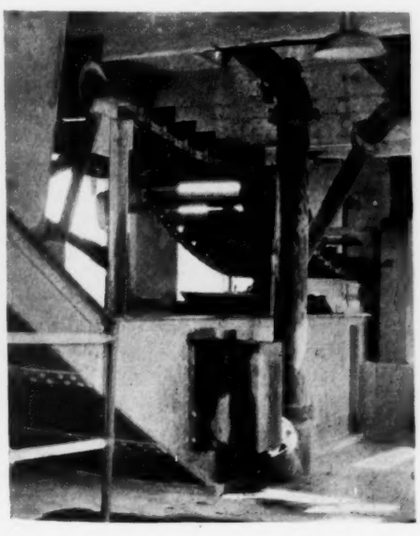
The bin containing the flux stone is so arranged that its contents can be recrushed in the 6-in. gyratory to increase the amount of stone going to the washing plant.

Washing Plant

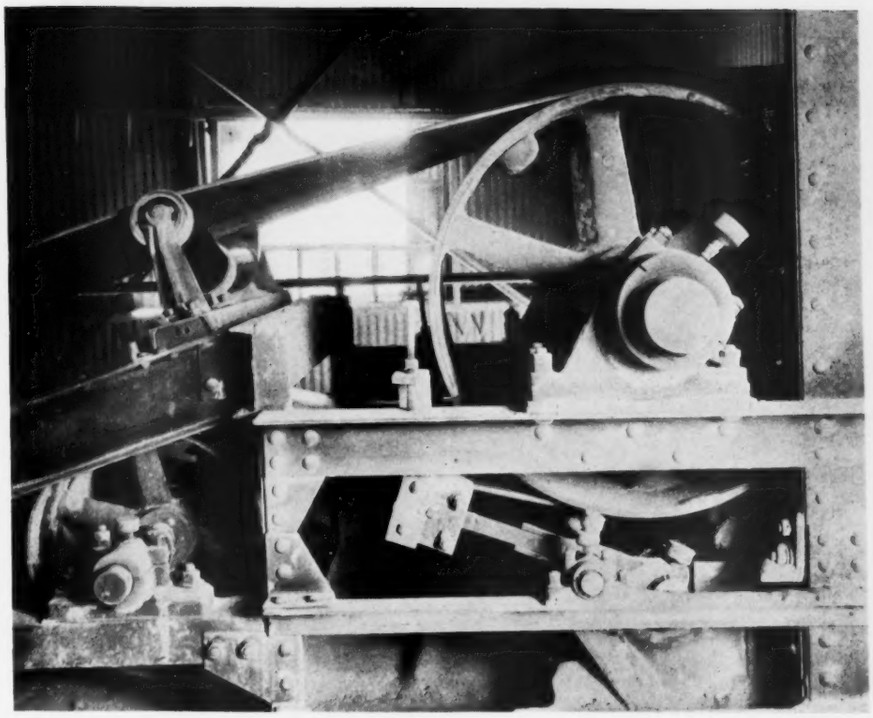
The minus 2-in. material in the 300-ton bin is drawn to a steel hopper at ground elevation to a 24-in. inclined belt, that conveys the material up to the top of the washing plant. This belt is fed by a reciprocating pan feeder. The conveyor itself is driven by a 50-hp. motor through enclosed gears. The belt discharges direct to a rotary washer barrel or scrubber, specially designed by the Bethlehem Mines Corp. for this work.

The scrubber is 6 ft. in diameter by 20 ft. long and is provided with lifter plates. At the discharge end is an overhang, 3 ft. long, consisting of ¼-in. mesh wire screens. The fines and water from the scrubber pass to a settling cone that discharges the settled products to a 48-in. sand drag, or dewaterer. The overflow is piped to a settling pond approximately 2000 ft. away, and this water through ground seepage eventually gets back into the system as previously referred to.

The rotary scrubber revolves 12.3 r.p.m.



The bottom of the sand drag is provided with spot-welded wearing plates



The head pulley installation showing design and rigidity of belt conveyor supports

and is driven by a 50-hp. motor through a gear train. The motor is in a steel dog house under the scrubber.

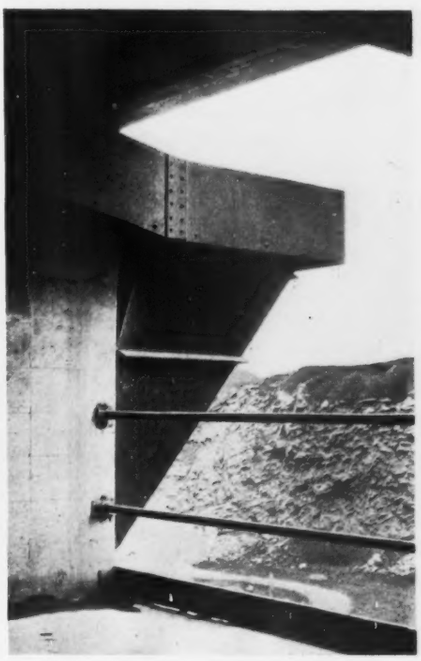
After scrubbing, the oversize passes to a 60-in. by 24-ft. rotary screen having a 15-ft. jacket of ¼-in. wire cloth. The main barrel of the screen has 16 ft. of ¾-in. round perforations and 8 ft. of 1¼-in. round openings. This screen was built by the mechanical department of the Bethlehem Mines Corp. and is driven by a 35-hp. motor through a right-angled bevel-geared speed reducer with a ratio of reduction of 17½:1. The screen operates at 12 r.p.m.

The fines from the jacket of the rotary screen pass to a settling or dewatering cone that serves the same sand drag previously referred to. This settling cone, and the other similar ones previously referred to, was designed by engineers of the company. The overflow from this cone then flows to a 6-in. centrifugal pump and is returned to the scrubber. Thus fresh water is only added in the rotary screen, a method of procedure that insures a clean product and an efficient use of water.

A 6-in. pipe passes through the center of the washer in which are 52 evenly spaced holes, 5/8-in. diameter, that are so drilled as to project a stream of water at an angle of 33 deg. with additional fresh water sprayed on the outside of the dust jacket. Fresh water is delivered to the washer through a 10-in. line.

The sand is received by a 48-in. sand drag, designed by the company, and it is of special interest, having wearing plates spot welded to the bottom of the main steel tank. Thus, when these plates are worn they can readily be replaced. The drag is back geared to a 5-hp. induction motor.

The scrubber, washer and sand drag are built over four reinforced concrete bins, each holding 150 tons, with a passageway below, from which trucks can be loaded. Gondola railway cars are loaded from side chutes. The capacity of the washing plant is rated at 200 tons per hour. Recently 750 tons of 5/8-in. to 2½-in. stone alone was produced



From this cone the overflow water from the screen and sand cone is sent to a pump and returned to scrubber

Sand settling cone discharging to the sand drag at Steelton plant

in 5½ hours at the washing plant, so that the actual capacity undoubtedly exceeds the rated capacity.

Rice Dolomite

This material is prepared from the washed stone and consists of ⅜-in. (minus) products. The stone used is drawn to a 24-in. belt that parallels the washer but on the opposite side of the plant from the car loading track. This belt discharges at a 4-ft. cone crusher, set to deliver the above sized product. The crusher when fed with ¾-in. to 2-in. stone has a capacity of 35 tons per hour. The use of a cone crusher for as fine a grind as indicated is unusual but has proved satisfactory. The cone crusher discharges to a 24-in. belt that elevates the rice dolomite to a second short cross conveyor belt that discharges direct to cars. This crusher is belted (12-in. belt) to a 100-hp. induction motor and a single 10-hp. motor drives the off-bearing and loading conveyor belt.

The executive offices of the Bethlehem Mines Corp. are at Bethlehem, Penn.

Following is tabulated data of interest in this operation:

CRUSHERS

Size	Speed	Capacity	Size product
48x60-in.	120 r.p.m.	350 t./hr.	7 in.
8K	330 r.p.m.	130 t./hr.	3½ to 4 in.
6-in.	300 r.p.m.	50 t./hr.	2 to 2½ in.

CONVEYORS

No.	Size	Length	Ft./Min.	Ply	Inclined	Capacity, t./hr.
1	42-in.	315 ft.	400 ft.	7	18 deg.	400
2	24-in.	127 ft.	300 ft.	6	18 deg.	214
3	24-in.	220 ft.	350 ft.	6	18 deg.	160
4	24-in.	58 ft.	100 ft.	4	Horizontal	75
5	24-in.	84 ft.	100 ft.	4	18 deg.	75
6	24-in.	20 ft.	100 ft.	4	18 deg.	75

GRIZZLIES

Name	Size	R.P.M.	Size opening
Cataract	9-42-12	50	2½-in.*
Bar	4 ft. by 8 ft.	....	4½-in.
Bar	4 ft. by 8 ft.	....	5-in.

*Square used (maximum 2¾-in.).

MOTOR SCHEDULE

Motors	HP.	Speed (r.p.m.)
48x60-in. jaw	150	480
8K.	100	725
6-in.	50	720
Conveyor No. 1	60	710
Conveyor No. 2	25	715
Conveyor No. 3	50	720
Cataract grizzly	15	705
Vibrating screen	5	705
Conveyor No. 4	10	710
Feeder	5	705
Scrubber	60	710
Screens	35	720
Conveyors Nos. 5 and 6	10	710
Sand pump	20	710
Water pump	50	1450
Water pump	75	1440
Sand drag	5	705
Cone crusher	100	720

Concrete Railroad Beds

CONSIDERABLE INTEREST was taken in the proposal to lay railroad tracks on permanent concrete roadbeds when it was made by the president of the Pere Marquette railroad a few years ago. Apparently it was forgotten by the public, but the Pere Marquette experimented with the idea and its latest design for a concrete roadbed seems to be giving satisfactory results. This is described in the December, 1929, issue of the *Journal of the American Concrete Institute.*

The first design tried was a series of concrete slabs 39 ft. long, 10 ft. wide and 21 in. thick. These were reinforced with structural steel. Washed gravel and sand were used as aggregates and the concrete was designted by the water-cement ratio method for 4000 lb. to the square inch. The actual strength was somewhat greater. It was intended to lay the rails on a metal plate, as it was thought the concrete would be abraided under the rail if the rail rested directly upon it; but owing to a change in design the rail was placed directly on the concrete and three years' service has shown no damage on this account. In insulating one rail for block signals, pieces of fibre were placed under it, and this was found to hold down bolts with a firmer grip and keep them from stretching with the vertical movement of the rail.

The objections to this concrete roadbed from the passenger's point of view were that it gave a feeling of rigidity and that the noise was increased, the surface of the concrete reflecting the sounds up into the car. But the rails held well in line and level.

From the experience gained with this design a new design was made that is much cheaper to construct and which has better riding qualities from the passenger's point of view. This design employs concrete slabs 19 ft., 6 in. long, 9 ft. wide and 6 in. thick, with expansion joints between. Cast with the slab are two girders 24 in. wide and 14 in. deep, above the slab. Strips of creosoted wood in the tops of these girders receive the rail and on each side are metal strips for bolts by which the rail may be adjusted exactly to its position and then held there securely. The spaces between the girders and on the outside are filled with gravel which does not reflect the noise into the car as the solid concrete did.

In the opinion of Paul Chipman, who wrote the paper, a railroad can be laid with such a permanent bed as this for $13,000 to $18,000 per mile additional expense. The advantages he names are a saving in maintenance which he figures at $2,000 per mile on main lines, a lessened wear on equipment and a reduction of about 15% in track train resistance. Higher speeds would be permissible, which is important now that the public is demanding higher speeds.

Miniature Golf Courses Heavy Users of Concrete

A WIDE and ready market for concrete has been presented with the increased construction of miniature golf courses. Each course uses a minimum of 25 bbl. of cement and the more elaborate ones use as much as 250 bbl.

Concrete is used as a base for the fairways, for walks, bunkers, water hazards, for elevated tees and for curbs. Concrete meets the need for a plastic material and the demand is increasing. Oftentimes the concrete is colored. To some small extent the demand for concrete has been held stable, due to these small courses coming at a time when building is at a low level.—*Seattle* (Wash.) *Journal of Commerce.*

Thomaston (Me.) Select Men to Study Cement-Dust Problem

FROM 92% to 95% of the dust, or vapor, created in the manufacture of cement at the Thomaston, Me., plant of the Lawrence Portland Cement Co. is already cared for by mechanism which human ingenuity has already devised, and the problem which is still faced by a research commission is how to take care of the troublesome balance.

This was learned recently by Joseph L. Paquin, Arthur J. Elliot and Rodney Jordan, the Thomaston selectmen, who visited the plant. They were on the premises two hours, conferring with Chief Engineer Carl H. Sonntag and other company officials.

They learned that the Thomaston plant was already equipped with every dust-preventing device that any other mill in the country has, and that engineering skill is still being exercised to make exit gases of the stacks 100% dustproof.

The attitude of the Lawrence Portland Cement Co. is this: Show us any successful method of caring for the existing dust and it will be adopted immediately.—*Rockland* (Me.) *Gazette.*

Raw Grinding and Slurry Control*

In Portland Cement Manufacture

By R. J. Binford
In Charge of the Mechanical Departments, West Penn Cement Co.,
West Winfield, Penn.

THE great progress made in the cement industry during the last decade has been principally through improvements in the types of grinding machinery. The degree of perfection attained in the grinding of the raw materials and the accuracy of the chemical adjustments largely determine the quality of the finished cement and these two factors also have an important bearing on the cost of manufacture. Unless the raw materials are properly and efficiently prepared before burning, it is not possible to adjust them in later steps of the process. We know today that *no step in the process can be neglected* if we desire a cement that is uniformly satisfactory. The grinding of the raw materials is therefore one of the important phases of cement manufacture.

Tube mills, although not perfect have many advantages over other types:

(1) They are continuous in operation.
(2) Dust is reduced to a minimum.
(3) Repairs are less.
(4) Little operating labor is required.
(5) Very large production is possible.

Their disadvantages are as follows:

(1) The wear on the liners and balls is excessive.
(2) Power costs are high.
(3) A large amount of space is required for installation.

The maximum production on a grinding mill is only accomplished by having the correct size of grinding media in each compartment. For a long period cement manufacturers were working in the dark on this point. As a result of extensive experiment and research the old rule of thumb methods for grinding has been discarded and today the selection of the proper size of grinding ball is a matter of scientific calculation. The theory of grinding in the tube mill is that the material is broken up by impact of the ball against the particle. Wearing action or abrasion also takes place but without the impact there would be practically no grinding. Assuming that the impact is great enough to break the particle the best grinding results when the maximum surface is exposed by the grinding media. This can be very clearly illustrated by using 2-in. balls to grind particles, some of which are 2 in. in diameter. The material in time will wear away but it will be found that much more time is required for the desired amount of grinding than would be needed if 5- or 6-in. balls were used. On the other hand, a 6-in. ball would take longer to get the required fineness from particles ¼ in. in diameter than a 2-in. ball, because the impact is large enough in each case but the surface exposed by the 2-in. ball is much greater than that of the 6-in.

It has been found by many users that the 5-in. ball is the largest that can be used economically. The larger the size of ball the greater the repairs needed on the mill internally. Because this size is the largest the material being fed to the mill should be small enough that the 5-in. balls will break it efficiently. This necessitates a feed to the mill such that nearly all passes a 1-in. mesh screen and *all* passes a 1½-in. screen. This specification sometimes requires another crusher or a change in the one being used. All materials are found to crush with varying ease. Some crush very quickly but others are almost impossible to break down. For this reason the size of ball that would apply for one material would not necessarily fit another material. A correct sized ball must therefore be worked out for each material. One stone, for instance, might be taken as a standard for ball size and factors be worked out for others.

By extensive research it was found that the correct size ball for the maximum size particle passing the screen was: D equal $3.18\ P^{.53}$, where P is equal to the diameter of the largest particle in inches and D is equal to the diameter of the ball in inches.

As an illustration, assume that the screen between the first and second compartment has an opening of 0.075 inches. Substituting in the above formula, the correct size ball for the second compartment would be: D equal $3.18\ (0.075)^{.53}$ or 0.908 in., or the ball size would be the commercial ⅞. This formula has been found to work out very satisfactorily.

Summing up it may be said that efficient raw grinding is the selection of a proper size grinding media for a proper size of particle, assuming, of course, that other mechanical features are properly cared for.

Let us now consider the question of control of the slurry. Control of the slurry covers three things: (1) Grinding to the required fineness for efficient burning and for the desired quality; (2) maintaining as low a moisture content as will allow the slurry to be handled easily and quickly; (3) maintaining a correct chemical balance of the different compounds which are necessary in the finished cement.

The desired fineness can only be determined by the economical point balancing the benefits. It has been proven that the finer the raw materials are ground the better combination the materials will have in burning and the better the quality. However, the finer the grinding the higher the cost of manufacture. It is therefore the practice to grind the materials to that point where the maximum demand for quality in the cement will be satisfied, and still maintain costs as low as possible. Inasmuch as the specifications for portland cement have been growing more and more exacting the raw materials are of necessity being ground finer as time goes on. This applies also to the finished cement.

The water added to the materials, so that pumping can be done, is kept at a minimum. The water added has to be evaporated in the kiln which means increased fuel consumption. We use the wet process at West Penn because by no other method could we secure the intimate blending of the raw materials that is necessary to secure the high quality in the cement that we must have. From the standpoint of economy, however, the water content of the slurry is kept as low as possible and this is about 33 to 35%.

*Abstract of an article in the *West Penn Cement Safety News.*

Vancouver, B. C., to Have Steel Industry

DEVELOPMENT of large limestone quarry operations for flux stone are in prospect in British Columbia as the result of plans to establish a $23,000,000 steel plant at Vancouver under the name of the Coast Steel, Ltd.

Coast Range Steel, Ltd., has vast ore deposits at Texada Island, situated approximately 50 miles north of Vancouver. The company is also preparing to start diamond drilling and other work at Fanny Bay, 120 miles north of Vancouver on the mainland, and the Klaanch iron mines and Sechart iron mines, both on Vancouver Island.

The company also owns the Lime Kiln Bay quarries on Texada Island which, according to government reports, contain the purest limestone in the world in unlimited quantities.

It is announced the contemplated plant is to have a 500-ton a day production of pig iron.

Soft Rocks in Aggregate

IN THE PROCEEDINGS of the 16th Annual Conference of Michigan Highway Engineers there is a report by Prof. W. J. Emmons on the effect of soft rocks in coarse aggregates. The investigation from which the figures in the report were taken was made at the Michigan State Highway Laboratory at Ann Arbor. It is the first, so far as is generally known, that has considered these undesirable aggregate materials as a group and has given really definite information as to their effect on the strength and durability of concrete which includes them. The conclusion drawn is that the soft rocks tested should be kept to the lowest economical limit, although the report purposely abstains from specifying what that limit should be in percentages.

The rocks tested were hard absorbent sandstone, "intermediate" or border line sandstone, soft (loosely bonded) sandstone, shale, ochres and "floaters." The last is a local name given to a "curious light weight, porous, fossiliferous, dolomitic material" which is found in some Michigan gravels. Some properties of these rocks and their feeble resistance to freezing and thawing, are given in the table which follows. Chert, while it is not a hard rock, was included in the freezing and thawing tests because some of it was present in the standard gravels with which the soft rocks were mixed and it affected the freezing and tests on the soft rocks.

SODIUM SULPHATE AND FREEZING TESTS OF SOFT AGGREGATES

	Specific gravity (apparent)	Absorption Lb. per cu. ft.	Soundness Na_2SO_4 5 alternations Pct. total pieces Cracked	Disinte-grated	Freezing and thawing water 12 alternations	Gravel abrasion Pct. wear
Hard absorbent sandstone	2.06	10.1	60	40	Surface disintegration (slight)	40.8
Borderline sandstone	2.11	11.8	60	40	Badly disintegrated	58.0
Soft sandstone	1.91	15.6	....	100	Many pieces entirely disintegrated	66.8
Shale	2.07	9.1	....	90*	Disintegrated	39.1
Ochre	1.65	21.3	....	100	Disintegrated	82.3
Floaters	1.42	24.2	70	30	Surface disintegration	43.2
Chert	2.41	5.9	25	23	25% pieces cracked; 16% pieces disintegrated	4.3
Standard gravel	2.68	1.9	0	0	Not made	4.7

*Parallel to bedding planes.

The standard gravel was mixed with 2%, 3%, 5%, 7%, 10% and 15% of each of the soft rocks and made into concrete for testing. The mortar-voids ratio was used for proportioning the concrete so that the cement content was practically the same for all specimens. These were tested for both compressive and flexural strengths. As the position of a soft piece in the beam had an important effect on the flexural strength, measurements from the center of gravity to the surface of the beam were made with every soft piece that showed in the break. By calculating the effect of individual pieces in this way some rather erratic results were brought into closer agreement.

The report is long and the results of tests are given in several tables and graphs. The method of showing the effect of the soft rocks mathematically is that of plotting the strengths against the percentages of soft rock present and then drawing a straight line representing the relationship. One of the graphs is reproduced.

For example, the equation for hard sandstone compressive strength is that of the dotted straight line in the graph,

$$y = 4.00 - 0.028x$$

where y is the strength in thousands of pounds and x is the percentage of sandstone present. With 7% present the strength should be $4 - 0.028 \times 7 \times 1000$, or 3814 lb. A similar equation was found for the flexural strength, but corrections had to be made for the position of the soft piece in the beam as mentioned.

But while such a line can be found from the plotted points, the "scatter" is very wide. Some of the strengths with soft pieces go well above the strengths of the control pieces This is most marked in the tests on soft sandstone. The strengths on 3% sandstone and 5% sandstone were 4570 lb. and 4650 lb., respectively. The explanation given in the report is that while the aggregates were stored in a damp condition there must have been some absorptive power left in the soft and intermediate sandstone. This took up some of the mixing water and reduced the water-cement ratio and consequently increased the strength. This is reasonable, as the effect of absorption on the water-cement ratio is well known.

Shale came out very well in this investigation and the paper suggests that the technique was not adapted to show the real effects of shale. The compressive strength fell off quite regularly as the percentages of shale were increased, but the flexural strength was not affected very much. The explanation given is that shale, which tends to disintegrate as it dries out, was kept in its best condition by being stored damp. Also, the method of making the beams laid the flat pieces of shale so that they would best resist breaking while the ramming of the concrete into the cylinders to be tested for compression placed the pieces in a position "likely to accentuate their natural weakness along the lines of cleavage when tested in compression."

TABLE 1. COMPRESSIVE STRENGTHS IN LB. PER SQ. IN.

Per cent of soft rock	Hard sandstone	Intermediate sandstone	Soft sandstone	Shale	Ochre	Floaters
0 (Control)	4012	3942	4410	4351	4530	4627
0 (Control)	3827	4385	3810	4298	4175	4118
2%	3910	3858	4280	4503	4002	3930
3%	3845	3907	4570	4115	4008	4252
5%	3746	4217	4640	4055	4010	4287
7%	3862	3670	4270	3970	3615	4290
10%	3700	3974	3760	3672	3330	3973
15%	3380	3808	3880	3257	3216	3657

Ochre and "floaters" gave results similar to those found with sandstones and shale, so far as strength alone is concerned.

Owing to the corrections for position, the flexural strengths cannot be tabulated in a short form. But they do not differ so materially from compressive strengths, so far as the effects of the soft rocks are concerned. Hence, to show the effects, all the average compressive strength results (except those obtained after freezing and thawing) have been collected into Table 1.

If the tests with soft rock up to the usual specification limit of 5% are all that are taken into account, it would be hard for anyone to say whether any of the specimens tested contained soft rock or not. The variations in strength are no greater than those found with the control specimens, which were free from soft rock altogether. With 7% to 15% of soft rocks the effect of lowering the compressive strength is more plainly shown.

Effects of Soft Rocks on Durability

Although the effect of soft rocks on strength is not great, the effect on durability, resistance to freezing and thawing, is a more serious matter. The tests were severe, 25 alternations being given. Some of the control samples suffered as well as the samples containing soft rock. In judging the results it has to be remembered that a sufficiently severe freezing and thawing test will destroy almost any concrete. The report notes a tendency for the trap and quartzite particles to pull away from the mortar in the beam tests made after freezing. The destructive effects of the chert present are especially

TABLE 2. SUMMARY OF RESULTS OF FREEZING AND THAWING TESTS—NUMBER OF PIECES APPEARING IN DETERIORATION

Class of stone	Pits	Spalls	Fractures	Rating	Per cent appearing
Hard absorbent sandstone	7	1	....	9	0.2
Borderline sandstone	23	8	18	93	2.5
Soft sandstone	35	28	22	157	4.2
Shale	2	....	....	2	0.1
Ochre	65	17	29	186	5.0
Floaters	....	1	4	14	0.4
Chert (average for series)	....	....	....	226	6.1

emphasized. It is stated that it seemed to accentuate the effect of the soft rocks.

The strengths in compression were not so much lowered and in some cases there was noted an increase of strength after freezing. But the effect on beam strength was very marked. In the case of soft sandstone and ochre some beams were so nearly disintegrated by freezing that they could not be tested. Hard sandstone, on the other hand, was very little affected.

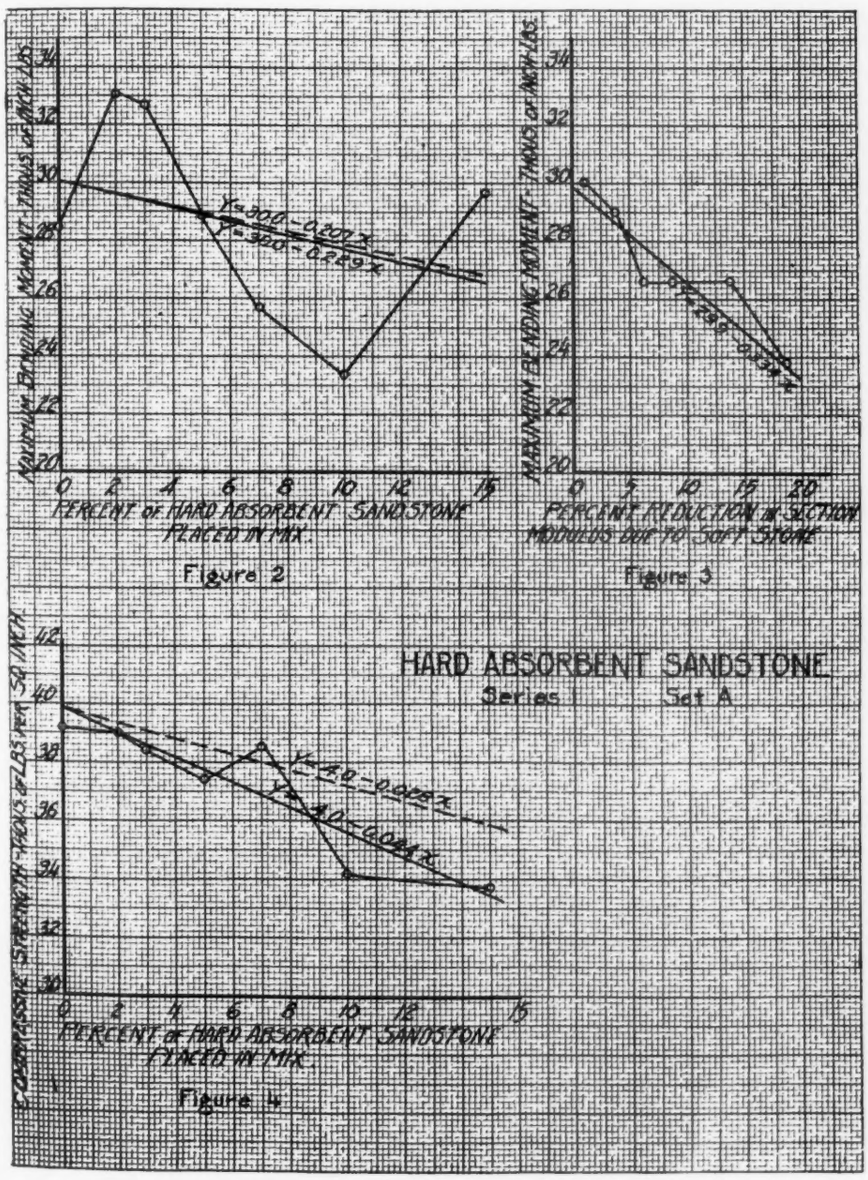
The figures are such that all of them would have to be published in order to get a clear picture of the effects of freezing and thawing on strength. But the effect as shown by the pitting and spalling of the specimens has been collected into Table 2. Pits are rated as 1, spalls as 2, and actual breaks as 3 in computing the effects.

It is no news, of course, that pitting and spalling will take place in concretes that contain these soft rocks if the soft pieces are anywhere near the surface. The seriousness of such effect depends on the use that is to be made of the concrete. It would be serious in highway paving or sidewalks, but it would not be serious in massive concrete, judging by what is shown in this and other reports.

The conclusions reached by the report are: The normal strength of the concrete is reduced (by these soft rocks) and the liability of deterioration under freezing and thawing is greatly increased.

A more extensive investigation, including exposure under different conditions, is necessary for quantitative measures.

The investigation unmistakably points to the desirability of reducing to the economic minimum the percentages of the soft rock tested in coarse aggregate.



Graphs showing results of tests made by the Michigan highway engineers to determine effect of soft rocks in aggregates

Mid-Year Survey by Universal-Atlas Cement Co.

CONFIDENCE that the next six months will bring definite improvement to the construction industry is shown in the mid-year survey by the Universal-Atlas Cement Co., a subsidiary of the United States Steel Corp., in which responses have just been received from 163 sales and technical representatives in 42 states.

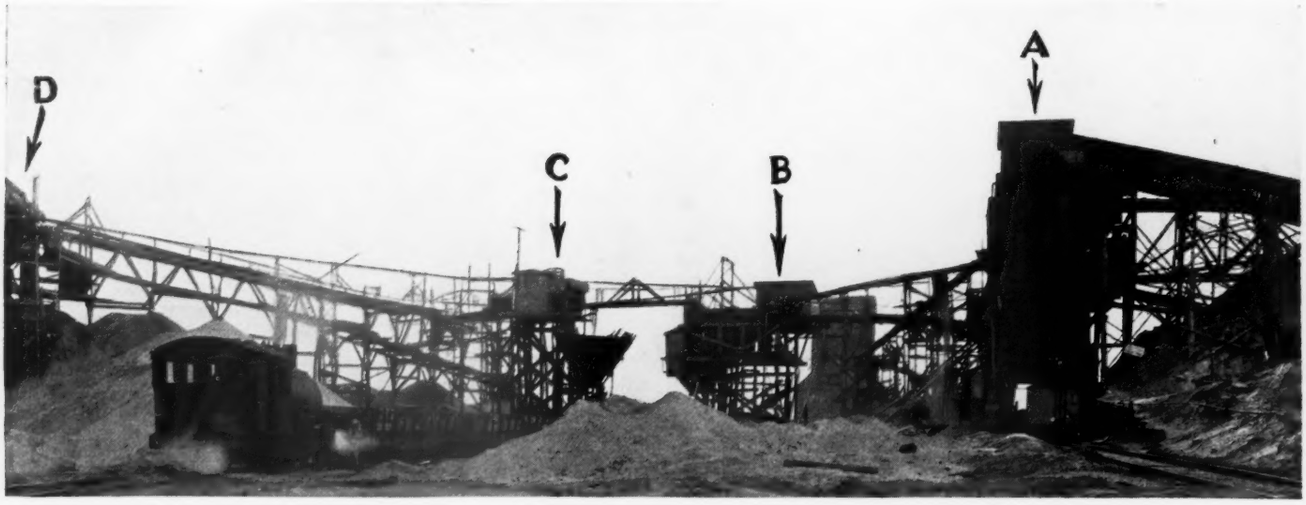
Of the company's representatives, 124 answered "Better" or "No change" to the question "What are construction prospects for the rest of the year?" and only 39 answered "Worse." "Better" led "Worse" three to one in the East, and four to one in the South and the two were nearly even in the Great Lakes states.

"We felt that reliable information on construction would come from these field representatives," said B. F. Affleck, president, in commenting on the survey, "because they are in constant touch with architects, engineers, contractors, dealers, public officials and others who shape and execute construction programs."

In the highway construction field, 88 representatives found the work ahead of last year, 38 found it equaling last year and only 31 reported evidence of decline. The biggest gains were reported in the East and the farm belt, with the smallest in the South. Street and alley paving was generally said to be under last year. In the public buildings field a substantial majority stated work was as great as or greater than 1929. No immediate improvement in the residential field was anticipated.

An employment situation question drew 35 replies of "Getting better," 53 of "Getting worse" and 72 of "No change." The public was planning to take vacations as usual, 88 reported, while 71 reported vacation plans somewhat curtailed.

Little sentiment is shown either for or against the new tariff law, according to this survey. Districts "Pleased" by the tariff led those "Resentful" by a score of 28 to 18. Even in the South the sentiment was about equally divided; but the survey's highest total, 108, went to the great American attitude, "Indifferent."



New Jersey Sand and Gravel plant. Arrows indicate: A, main washer building; B, sand cover for concrete sand; C, sand washer, and, D, sand cones for fine sands

Has Special Sand Pump and Other Operating Features

New Jersey Sand and Gravel Co. Plant at Farmingdale, N. J., Makes Departure from Routine Methods

NOT SATISFIED with results obtained with standard equipment for a special service the operators of the New Jersey Sand and Gravel Co., Farmingdale, N. J., developed a new sand pump, tried it out in their own operations, and it has made a remarkable operating record. They have also developed a method of fastening the perforated plates or screens to a rotary screen that simplifies that operation down to a point where the time required to make the changes compares favorably with the time element for changing screens on one of the vibrating type.

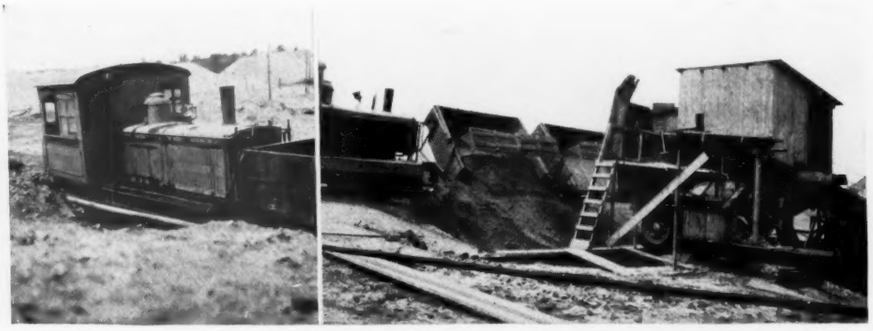
To be more specific in connection with this operation, a brief description is necessary: The sand and gravel is loaded from a bank by two ¾-yd. Northwest shovels mounted on crawler treads, which load to 5-yd. Western cars. These are hauled to the plant, roughly 4000 ft. away, by either of two, 14-ton Plymouth gasoline locomotives in trains of seven cars each. The cars are dumped to a pit from which the material is fed by gravity to a 24-in. inclined belt, serving a rotary conical screen.

Quick-Change Screen Plates

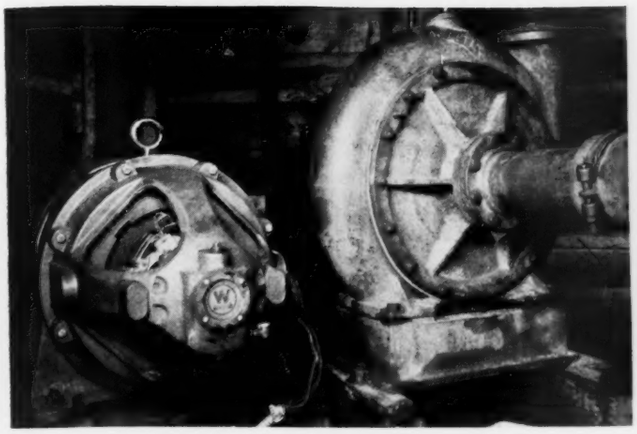
This is the screen with the quick-change plates, referred to in the previous paragraph. It is 10 ft. long by 6 ft. 8 in. and 3 ft. 3 in. in diameter and is made in three equal sections. The first two plate sections have ¾-in. perforations, and the small diameter end section has 1¼-in. perforations. The two cast-steel spiders supporting the screen sections are connected by two 3-in. by 3-in. angle irons, back to back. Through these angles ¾-in. holes have been bored at frequent intervals and through them is passed an ordinary U-bolt. A special saddle or yoke is designed to fit under the U-bolt, so that by tightening these bolts the screen quadrants can be held in place. To remove the screen plate it is only necessary to remove the nuts from the U-bolts (from the outside), slip out the bolt and saddle, and the plate is free from its position. Special replaceable wearing plates are provided under each set of angles to take care of the wear, and a change of screen sections is a comparatively simple matter. Water is supplied to the screen through a centrally located pipe.

The oversize from this conical screen falls to an 18-in. belt conveyor and is returned to a small jaw crusher placed over and discharging into the dumping hopper at the initial plant operation. The crusher was made in the shops of the company and is of small capacity, for the amount of coarse gravel, as in most of the central and south Jersey deposits, is of small size.

The throughs from the conical screen are further washed and sized by a battery of vibrating screens. The gravel falls to bins from which it is drawn



Left, one of the 14-ton locomotives used. At right, dumping to the pit which serves a 24-in. conveyor belt going to the conical screen. The oversize returns to a small jaw crusher directly above the pit and then back to the original pit



Left, this is the old style pump used by the New Jersey company. The new types provide an unusual housing that simplifies removal of the liners. At the right, the wooden structure that houses the sand pump, which gets its feed from the sump. The sump overflows to the waste ponds

direct to cars for shipment or for stockpiling.

There is some clay associated with the bank material so that some hand sorting is resorted to at the belt conveyors and as the gravel passes over the vibrating screens.

The sand from the upper vibrating screens falls to a settling tank, the partially dewatered sand flowing to a sump and the overflow from the tank passing to waste through spiral-riveted pipe.

The flow of material from the sand sump, for the production of sand, varies according to the type or grade of sand that is wanted at the time. If a sand is wanted having 5 to 8% of minus 50-mesh material, that is a reasonable amount of fines, the pump delivers direct to two modified Allen cones that discharge by hand control direct to cars. If plaster sand is wanted, the pump delivers to two Link-Belt cones, and if a sand with 3 to 5% of minus 50-mesh material is wanted, the same 6-in. pump can deliver to a No. 2 Dorr sand washer. The sand washer discharges to a small bin from which the sand is drawn to cars.

Specially Designed Sand Pump

This sand pump, which supplies the bowl and cone classifiers, was designed by the mechanical department of the New Jersey Sand and Gravel Co. This company was not satisfied with the results that they were getting from the pumps previously used so one

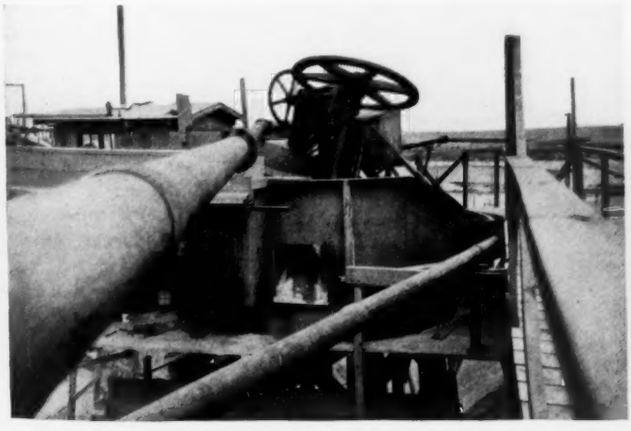
The tri-batcher bins

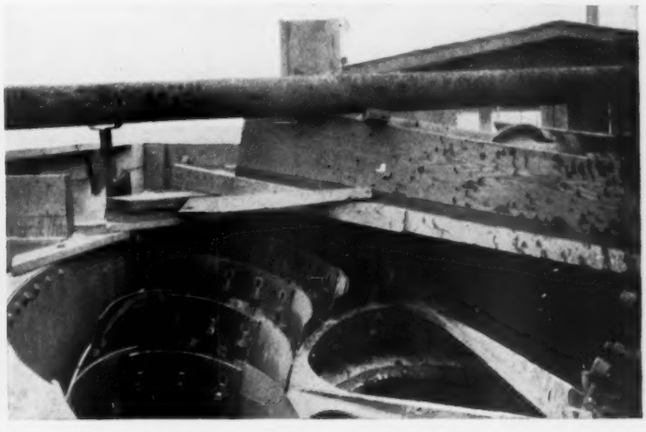
was developed for this particular service. The pump now in use has since been improved as to the housing, for the new type has two sections which form the head of the pump shell and are cut at an angle to give a size opening large enough to allow passage for manganese steel liners. These openings give free excess to liners and allow any liner to be removed without disturbing the main shell.

To overcome the wear at the junction of the hub and disk a water seal is used, and instead of bringing water in on top of the shaft it is passed through a lantern ring into the center of a hollow shaft that discharges in a spray between the baffle and the impeller hub. The back pressure of this water keeps the abrasive material from cutting out the hub. The pump is said to be able to handle slurry without dilution as all that is necessary is to maintain a pressure slightly below that of the slurry being pumped, thus no water gets into the pump from the seal. The pump is equipped with solid Timken roller bearings. The company has the pump fully protected by patents and is planning on marketing it under the trade name of the "F. H." pump. At the Farmingdale plant one of the pumps has been in operation for two years and there was no sign of wear between the hub and impeller. The pump is driven through a silent-chain drive at 870 r.p.m. by a 40-hp. Westinghouse motor.

Sand Washer

The Dorrco sand washer previously referred to consists of a circular, flat-bottomed





The left-hand pictures shows the sand washer in position and the right gives an idea of how the semi-circular drag scoops are made adjustable so as to control the amount of fines produced

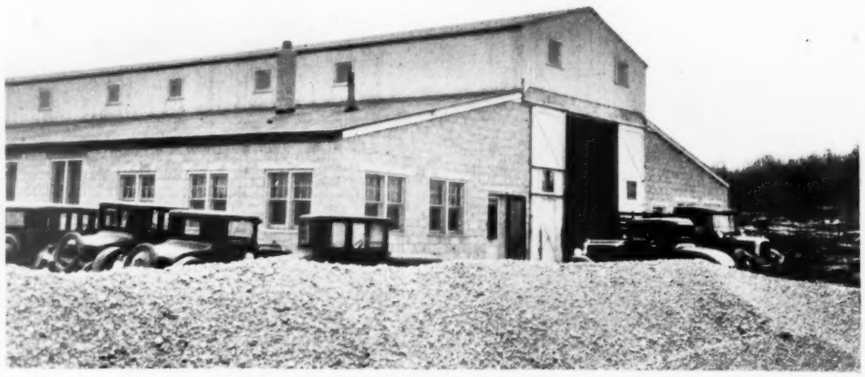
container fitted with an annular ring, which is inclined at a slope of 4 in. per ft., and in this container operates a circular spider to which are attached a number of semi-circular scoops. The mechanism is supported by a super-structure and at right angles to the annular ring. The surface of this ring acts as a tray on which the scoops travel.

The feed enters through an adjustable gate near the highest elevation of the annular ring and flows up into the central portion of the ring. The velocity of flow and the turbulence due to the revolving mechanism carry the clay, silt, etc., in suspension and these are carried off through an overflow lip.

The sand settles on the ring and is picked up by the revolving scoops which carry it above the water level. During this travel the excess water drains back to the washing compartment. The entire mechanism is only 10 ft. in diameter and requires 4 ft. head room for the washing compartment, making a very compact installation for one of such capacities. The head room required for the drive mechanism can be varied to suit conditions.

The operators of the Farmingdale plant are well pleased with the quality of the sand produced from this sand washer, stating that 200 tons per hour can be passed through the machine and yield a product with less than one-half of 1% clay although it must be understood that the machine is only used when sand with a comparatively small amount of 50-mesh material is wanted. So far they have been unable to make a product with a higher percentage of fines with this device although experiments are still under way.

There is very little wear on the drags as their weight is carried by the bearings which are located high enough to be out of contact with any abrasive material. A 15-hp. motor drives the classifier through a bull gear and roller chain, which drives the drags at one revolution in two minutes. This company also has Dorrco sand washers in its plant at Carpentersville, N. J.



Machine shop of the New Jersey Sand and Gravel plant at Farmingdale, N. J.

It has been found that by allowing the fine sand from the Link-Belt cones to discharge to ground storage, the clay content is materially reduced simply by drainage. Reclaiming of the drained sand is done by a ¾-yd. Northwestern gas-electric shovel. A Marion and an Ohio crane are also available for this work. Switching is done by two 60-ton American locomotives. Blast sand is dried in a Combustion Engineering Corp. dryer.

The New Jersey Sand and Gravel Co. has five plants that have an annual capacity of 1,000,000 tons per year. The production and grades of material at these plants have all been subjected to a scientific analysis so that each plant is operated at the optimum capacity to produce a maximum profit and at the same time to obtain scientific proportioning of the banked material to coincide with the market demands.

The company ships some material by truck using Blaw-Knox tri-batchers for the sand, ⅝-in. and 1-in. gravel sizes produced. Most of the shipments, however, are over the rails of the Central Railroad of New Jersey and Pennsylvania railroad.

The offices of the company are at Asbury Park, N. J. J. Claude English is president; David W. Newman, vice-president; Elmer H. Geran, vice-president; Martha W. Chadwick, secretary; Wm. H. Harrison, treasurer, and Harry Hills, superintendent.

Arrow indicates how sand washer is mounted in position to discharge to cars through a small bin at New Jersey Sand and Gravel operation

Aerial Geological Photography

AN INTERESTING feature of the quarterly report of the California Division of Mines is a chapter devoted to the value of aerial photography for the geologist. Through a hole in the floor of the airplane the mapping camera records its pictures at a height of from 1000 to as high as 17,000 ft. in some of the photos shown. Each snap overlaps the other by usually 60%. Time of day, reasons and weather are important factors in successful topographic picture making. Some sections of California have already been mapped and are available at so much per square mile. When shown with a stereoscope the photos reveal topographical features in most realistic manner. Rock outcrops that defy detection when exploring an area are said to be readily visible to the aerial camera.

Geology of Red Lake Basin

THE ANNUAL REPORT of the Ontario, Can., Department of Mines contains an interesting outline on the geology of the basin of Red Lake in the district of Kenora, Patricia portion, written by E. L. Bruce and J. E. Hawley. In this basin the country rocks are greenstone, overlaid by sediments, and porphyry and granite intrusives. Au occurs as (1) quartz veins in greenstone, (2) carbonate zones and (3) fractured zones containing quartz veins in quartz porphyry dikes, the only commercial deposits. The minerals in (3) are quartz, Au-bearing, Au tellurides, chalcopyrite, pyrite, galena and sphalerite. Metallic minerals are small in quantity, in many, even with high Au content, not visible. Granite is the parent rock. A Ag-bearing galena vein is known. Talcose rocks (soapstone?) are fairly common from the alteration of the highly magnesian greenstones. A few veinlets of asbestos are known in the greenstone.

A Development in Air Classification

Specially Designed Device Using Rising Air Current for Separating Flake Mica from Mica Schists and for Many Other Applications in the Rock Products Industry

By George Adams Roalfe
Consulting Engineer, Long Beach, Calif.

INCREASING INTEREST in the use of air in mechanical processes is apparent from the number of articles on this subject appearing in technical magazines. ROCK PRODUCTS has had a number of excellent ones in the past few months. Many of these have had special reference to the application of air in classifying portland cement during both raw and finish grinding. Evidence, from numerous sources, indicates increased capacity and economy in grinding operations when suitable separators are used to remove material reduced to finished product as rapidly as possible. Foreign as well as domestic practice is rapidly turning in this direction and the interest being aroused will undoubtedly increase with increased knowledge of the subject and its application. Other applications are equally deserving of study and development.

Experiments on Mica Schists

About two years ago my office undertook the development of an air process for the separation of flake mica from micaceous schists. Many pegmatites contain large tonnages of finely crystallized minerals. In mining for book mica much material of this character has to be worked and in most operations discarded. It was felt that to place this industry on a sound basis some method should be devised whereby the mica content could be recovered, thus reducing the uncertainty of profitable recovery.

The deposit under consideration was located in the eastern portion of San Bernardino county, California. This section, in common with the major portion of southwestern United States, is distinctly arid. Water development in most cases, if possible at all, is extremely expensive. It was felt that air separation offered the only practical solution.

While mica separation was the immediate problem, the development of a successful and economical process was believed to be of wide importance in the recovery of minerals in this section. The rapid growth in industrial activity on the Pacific Coast, and particularly in southern California, is resulting in increasing demands for many mineral raw materials. With all these conditions in mind a systematic research was initiated.

As primary considerations the following objects were laid down as goals. The development of a machine with few moving parts, simplicity, and working with the lowest air pressures or velocities possible, economy. Before entering upon the laboratory work all available literature, including patents, on the subject was collected and studied. This eliminated the necessity of covering many phases which had already been investigated.

In the latter part of 1929, the investigation resulted in a machine which handled the mica separation very efficiently. To protect this office, application was made for a patent, which is now pending. The results obtained on mica as well as on several other materials seem to justify the statement that this investigation has been successful. Many applications not now recognized will undoubtedly appear upon further study.

Classifier Described

In principle the process consists of a tower or enclosure into which the material is fed at the top and allowed to fall in a free stream. In falling it is opposed by an upward current of air. At intervals in the tower are located fixed catch-basins, attached to which are diaphragms or adjustable baffles forming orifices. The catch-basins are also connected with outlet pipes or ducts through which fractional air and products are discharged.

In operation the air entering at the bottom is forced up through the first orifice from the bottom. After passing through the orifice it expands and a portion is released through the lowest outlet into a suitable collector. The balance of the air passes up through the next orifice and in turn expands and discharges another portion of the air through the next outlet. This reoccurs at each stage.

Tracing the material feed, it first falls into the top orifice where it encounters air at a relatively low velocity. Only those particles having very low mass or presenting large areas for given mass are prevented from falling through; these are consequently drawn off with the air released on that stage. Passing to the next stage, a second velocity condition is encountered and a heavier fraction will be removed. In each succeeding stage the operation is repeated and a given fraction is taken off. The heaviest or largest particles will obviously pass through all the orifices and be drawn off at the bottom.

The above description is typical, though the use may vary the actual nature of the separation. For instance, the orifices may have their areas arranged in a decreasing order from bottom to top, so that the actual air velocities in all are the same. In this case the product taken off at each stage would be very similar in character and the multiplicity of stages would permit heavier feeds, as the air stream would have repeated opportunities to remove the critical size. The process in brief consists of superimposed adjustable orifices, provided with suitable air and product drawoffs, through which material is allowed to fall against opposing air currents. The shape of the orifice does not seem to have material effect.

The original investigation has been greatly extended in the last few months and many materials have been experimented with. A unit built on the above described principles is in reality a classifier. However, when used in combination with screen classification it becomes a very efficient concentrator on many materials. The separation is due to the mass area relation for which air is critical, but does not seriously affect screening. The amount of air used is comparatively light, as the action is one of drifting rather than of lifting. This in itself makes possible its use on materials of coarser sizes than is usually advocated. Our experiments indicate that with relatively simple adjustments, extremely close classifications or separations are possible.

To discover if results comparable to those accomplished in the laboratory might be expected when operating on a commercial scale, trials were made with a unit capable of handling three to five tons per hour. These trials were confined to the mica separation, as the unit had been installed for that purpose. The results on the large unit were far better than those on the laboratory unit. This seems to be due to the longer period of time that the material was subjected to the action of the air currents in the larger unit. This conclusion is confirmed by further work in the laboratory.

Type of Mill Used Affects Product

As noted above, the first work was on mica. In this operation the mica schist was ground so that all passed a ¼-in. square mesh screen. The product of mill was fed on to a four-deck vibrating screen classifying it into four sizes. The rejects of the ¼-in. mesh screen were returned for reduction. For the test the screen cloths used

were ¼-in., 20-mesh, 50-mesh and 100-mesh. The resulting products were discharged into a four-compartment bunker. The plant as built had only one air unit, limiting to one the number of sizes which could be handled at a time. However, all sizes produced by the screen classification were successfully concentrated in the air unit.

These tests brought out conclusively the fact that the nature of this mill product had a very direct effect on the success of the separation. Milling in units of the impact type on the materials studied gave cleaner breaks along contact surfaces between the different minerals, greater uniformity of particle shape, and practical absence of flattened grains. On all sizes, the product of the upper take-off, if subsequently screened on a finer mesh screen to remove the dust, produced a perfectly clean product. On the finer meshes the biotite contained in the ore appeared in substantial quantities in the second concentrate of the first run. By feeding back this second concentrate and making the proper adjustment, a biotite-free muscovite was obtained in the first concentrate of the second run. When it is recognized that muscovite and biotite have the same specific gravity range, namely, from 2.7 to 3.0, this result is surprising.

Close examination of the concentrates of the second run showed that the portion of the muscovite which was split into individual laminae could be separated from the biotite. Muscovite particles having more than one lamina had sufficient mass to be concentrated with the biotite. This fact is of particular interest, as it gives a strong indication of the sensitiveness of the process. The separation is accomplished solely because the basal cleavage of the biotite is not as well developed as that of muscovite. It therefore became evident that in the successful separation of muscovite it was essential that the milling not only break the mica free from the gangue but also split it into single laminae. The remarks on milling have equal force when handling any other ore. The separator can only effectively concentrate that portion of the desired mineral which is freed from the gangue.

Experiments on Graphite

Another separation to which considerable attention has been given is the concentration of graphite. The graphite on which research has been made is especially difficult because it is largely amorphous. Milling of this ore is difficult due to the graphite being generally disseminated. In the coarser meshes only about half is freed from the gangue. On repeated trials 80% to 90% of the freed graphite has been separated into the first concentrate (60% concentrate). The second concentrate contains all of the remaining freed graphite together with those particles of combined materials which predominate in graphite. The third concentrate and tailings show marked reductions in graphite content. Their graphite content must be further released by milling or chemical means. As was the case with mica, separation is possible in all sizes. Using the first concentrate as the feed and rerunning, it is possible to build up the product to over 80%. As is true of all mechanical concentration methods, the finer the cut the richer the concentrate. But with increasing richness, volume is sacrificed. This process has been carried out for several stages and on each stage the first and second concentrates are richer than the feed. In this separation, as in the case of mica, the specific gravities of the several minerals are close. The success of the operation is largely due to physical characteristics.

Experiments with Materials of Different Specific Gravities

Turning to examples of ores containing minerals with large differences in specific gravity, research has been made on two ores of this character. The first was the concentration of cinnabar from its ore. In the particular ore experimented with, the cinnabar is very finely disseminated. The sample was all ground passing 100-mesh. This was classified by screening into two sizes, 100- to 200-mesh and passing 200-mesh. On both of these sizes concentration was accomplished. The samples available were not large enough for extensive work, but a very definite concentration occurred. Another ore on which experiments have been made is a gold-bearing quartz. Most of the free gold occurring in the sample would pass the 200-mesh screen. Particularly satisfactory results were obtained when close screening preceded the air separation. The coarse gold offered no difficulties.

Possible Substitute for Screens

Considerable work has also been done in studying the application of the unit as a classifier in lieu of screens. Various homogeneous materials have been classified. Experiments were conducted to determine its effectiveness on both coarse and fine classifications. A typical result on coarse classification is represented by the mill run product of a quartz ore. This contained particles ranging from ¼-in. down to passing 200-mesh. In the laboratory machine four simultaneous products are made. On several classification tests results within 5% of overs or throughs on selected screen sizes were obtained. For example the upper stage was set to take off minus 200-mesh, the next stage 100- to 200-mesh, the third, 50- to 100-mesh, all material coarser than 50-mesh to be discharged at the bottom. On several tests the product of the first stage ran from 95% to 99% through the 200-mesh; on the second stage, from 95% to 100% through the 100-mesh and from 0% to 3% passing the 200-mesh; on the third stage, results were even more critical. Other gradations in sizes are easily obtained. Possibly more critical results are shown by the results of fine classification. A typical example is that of ground gypsum. The sample used was screened so that all passed 200-mesh; this was fed into the unit and four differing fractional products taken off. The product of the first stage was practically free of fine crystalline and gritty pieces, while the tailings were harsh. Our work indicates that with homogeneous materials or with materials having similar particle form, extremely close classification can be accomplished. One marked difference between the air separator and multiple screens is the reversal of the order. In screens the coarse sizes are the overs and the fines the throughs, while in the air unit the finest fraction is the first product removed.

Application to Cement Clinker Grinding

At the present time several definite applications are being studied. One application is in connection with finish grinding of cement. It appears that the classifier is particularly adapted to this use where stage grinding is practiced. It is not necessary to keep the products of the several stages separate, as the classifier will produce simultaneously the proper feed sizes for the several stages. In connection with this problem negotiations are under way for the commercial manufacture of units under this process with some of the largest producers of mill equipment in this country. Other applications now under consideration involve its use as a concentrator. Still others are applications involving extremely fine classification with materials fed with difficulty.

The unit as developed to the present time appears to have many interesting possibilities. The particular method of applying air to accomplish useful work is believed to be new. It is easily adjusted, stable in results, providing the feed and air remain constant. Mechanically it is simple, there being no moving parts during operation in the forms used to date.

Promotional Booklet on Lime

AN INTERESTING PIECE of lime promotional literature recently received in this office was that sent out by Snowflake Lime, Ltd., St. John, New Brunswick, Canada.

It is in mimeograph booklet form entitled "Snowflake Lime" and covers in a quite complete and attractive way the whole subject of lime as manufactured by them, touching on the history, properties and uses of lime generally, and explaining the methods of manufacture and the ways in which the various forms of lime may be used to the best advantage.

The principal uses of lime in construction, in agriculture and for chemical uses are covered, and the advantages of hydrated lime as against lump lime and of magnesium lime as against high calcium in certain cases.

The durability, strength, workability and economy of lime mortars is emphasized, and the best methods of making mortars and putties from lump and hydrated limes. Many good points often overlooked in the handling of lime and lime products are brought out.

Researches on the Rotary Kiln in Cement Manufacture*

Part I.—Introduction—Outline

By Geoffrey Martin

D.Sc. (London and Bristol), Ph.D., F.I.C., F.C.S., M. Inst. Chem. Eng., M. Inst. Struct. Eng., M. Soc. Pub. Analysts, F. Inst. Fuels; Chemical Engineer and Consultant; Former Director of Research of the British Portland Cement Research Association; Author of "Chemical Engineering"

IN THIS WORK the complete theory of the rotary cement kiln has been worked out, based in the main upon thermo-dynamical calculation, in which the recent advances in physical chemistry have been taken into account.

As a result we are enabled to calculate the correct clinker output from a rotary kiln of any given diameter—ranging from 1 ft. to 20 ft. if need be—the theoretical output arrived at by thermo-dynamics being checked against actual practice. Also, the sizes of the clinkering and decarbonating zones necessary for a given output are determined, these sizes being also worked out by thermo-dynamics and checked against actual yields of kilns. Also the correct dimensions of rotary kilns are worked out, including rules for finding their lengths, diameters, and sizes of the various zones of both wet- and dry-process kilns. Also the correct air supply is worked out and the estimation of the fuel consumption from the exit gas analyses.

The value of such data is obvious, because on the one hand it enables the works manager—knowing the dimensions of his kiln—to know whether or not the kiln is being worked at maximum capacity and economy. It also enables the engineers who construct kilns to design them with certainty and guarantee output of any size.

Most of this work is new, being based upon researches carried out by the author while director of research of the British Portland Cement Research Association.

All the work has been carefully checked against actual practical results and will be found reliable.

It may at first sight appear surprising that since the rotary kiln has been in almost universal use since 1906 that this work was not done previously. There were, however, many technical difficulties in the way. First in order to accumulate experimental data the British Portland Cement Research Association carried out no less than 29 kiln tests on every variety of kiln. The masses of experimental data arising out of the tests had then to be collected; tables of specific heats and other physical properties of the gases and raw materials which occur in the process of manufacture had to be calculated and in some cases experimentally determined at high temperatures.

Exact allowances had to be made for radiation and convection effects of complicated nature. All this preliminary work represented immense labor and great cost.

A few lacunae still exist in our scientific data but enough scientific and engineering data have been accumulated to enable important deductions and suggestions to be made.

Perhaps the most striking result brought to light in the following pages is the degree of inefficiency of the rotary kiln.

For many years practical men have been aware that the rotary kiln is inefficient, but how and where inefficient could not be exactly known until the details worked out below were ascertained.

On the basis of the calculations presented the efficiency of rotary kilns is barely 19%.*

It is obvious, therefore, that there is present in the cement industry a wider scope for improvement both of kiln design and for research for improved methods of production than in almost any other manufacture.

One important practical result which is brought to light below is the fact that a rotary kiln fed with a slurry containing 40% of water should work with a fuel consumption of about 21 tons* of standard coal per 100 tons* clinker produced.

By reducing the slurry moisture below 40% improvements beyond this could be registered.

Another result which is emphasized by the inquiry below is the supreme importance from the point of view of fuel economy of attaining as high a flame temperature as possible in the clinkering zone. Such a high temperature cannot be attained without special precautions, chief among which is the preheating to as high a temperature as possible of the air entering the furnace.

The efficient preheating of entering air is by no means easy, but in view of recent advances in furnace design, does not present the same difficulty as formerly.

Perhaps, however, the most important result is the discovery of the predominant part played by radiation and convection—both internal and external—in causing fuel losses. These losses are very much more serious than has hitherto been imagined and it is only by their elimination by suitable kiln design that striking reductions in fuel economy will result.

Possibly the main reason why this influence has not been sufficiently recognized in the past is the fact that writers on the rotary kiln have been accustomed to regard all their heat units as of equal value. Heat balances of the kiln, such as have been repeatedly drawn up during the last 30 years, do not indicate that the B.t.u.'s available at different temperatures have very different values both chemical and financial. For example, only these B.t.u.'s available *above* a temperature of 1481 deg. F. (805 deg. C.)—the temperature of decomposition of calcium carbonate in the kiln—can be directly utilized for forming clinker. Consequently they are of great value to the cement manufacturers.

The B.t.u.'s available below those temperatures are, so to speak, merely waste products so far as clinker formation is concerned. They merely serve to preheat the entering slurry.

In view of this fact the ordinary heat balances of the rotary kiln are somewhat misleading in that all the B.t.u.'s in them are tabulated as if they were of equal value and of equal cost.

It is as if in making up a financial statement of an account we took, say, 1000 coins and regarded them as all of equal value. There may be gold, silver or copper coins among these 1000, yet this factor is neglected in making up the balance sheet, which simply tabulates the number of coins which was paid for each article irrespective of the value of the individual coins. This procedure would not meet with the approval of commercial men, yet it is precisely the modus operandi of the writers who have drawn up the ther-

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*It is shown below that an average rotary kiln consuming, say, 33 tons of standard coal per 100 tons of clinker should, if theoretically perfect, consume only 6.35 tons.

Defining efficiency as

$$E = \frac{\text{Possible fuel consumption}}{\text{Actual fuel consumption}} \times 100$$

we obtain

$$E = \frac{6.35 \times 100}{33} = 19.2\%$$

Tons referred to are British tons of 2240 lb. To convert to net tons (2000 lb.) used in America, multiply by 1.12.

mal balance sheets of our kilns in the past.

For example in the ordinary heat balance of the rotary kiln the external radiation losses on the whole available B. t. u.'s work out about 8%.

If, however, we work out the percentage of these radiation losses in respect to the valuable clinker—former B. t. u.'s—the only ones which count—we find that nearly 15% of the effective heat available for clinker formation thus uselessly disappears as external radiation. This alters entirely the complexion of the question of whether it is worth while stopping external radiation from the clinkering and decarbonating zones. We are, in fact, wasting nearly 15% of our fuel on account of external radiation from the hotter zones of the kiln and therefore the greatest trouble should be taken to stop such losses.

Moreover the loss of clinker output from radiation and convection *inside* the kiln is very much more serious than the loss due to external radiation. The importance of these internal losses does not seem to have been realized by practical men. The kiln is a tube with one end red hot and the other end comparatively cold.

High grade heat is radiated away from the red hot decarbonating and clinkering zones directly into the colder parts of the kiln without doing any useful work. In addition to this much high grade heat is carried away bodily by the hot gases from the decarbonating zone passing into the colder zones. Since every 918.6 B.t.u.'s of high grade heat (i. e. heat available above 1081 deg. F. or 805 deg. C.) thus carried away into the colder parts of the kiln represent a loss of 1 lb. of potential clinker it is obvious that no great progress in kiln economy can result until the design is altered so as to reduce such losses.

In the following articles of this series we have reduced to a matter of exact thermo-dynamical calculation most of the quantities connected with the rotary kiln.

Thus we have, for the first time, calculated exactly the exit temperatures which the gases coming from a rotary cement kiln will possess when the coal consumption for 100 tons* clinker is reduced to any given figure and when it is fed with a slurry containing any given percentage of moisture. This, previously, it has been impossible to do.

As a necessary consequence we can now calculate beforehand the amount of steam producible from these exit gases under all possible conditions—ranging from a dry process kiln to a kiln fed with a slurry containing say 50% of moisture.

Of course the converse proposition has long been solved—that is, *knowing the exit temperature and the composition* of the gases it has been possible to calculate the amount of steam that can be produced thereby—but it has not been possible up to date to calculate the exit temperature appertaining to any fuel consumption.

A chapter on the design of waste-heat boilers has been added, giving the amount of steam which can be raised therefrom under various conditions—a subject on which the writer has had much practical experience.

The determining of exact data is the first step towards modern technical advance. In Sir Charles Parson's words:

"The hopelessness of making progress in the absence of data and an intimate knowledge of a subject was deeply impressed on the minds of those who served on the Board of Invention and Research during the War, and who received at one period more than 2000 inventions and suggestions per week, of which only a minute fraction of one per cent were in any way helpful, while scarcely any were of practical value. The immense wastage of mental effort appeared to them deplorable."

From this point of view it is hoped that the data brought together in this research will prove indispensable to kiln designers, engineers and works chemists. Indeed without such scientific data it is difficult to see how any really efficient kiln could be designed as the engineers have never been presented with many of the essential facts.

Outline

The subject will be treated serially in succeeding articles under the following chapter heads:

Chapter I. Measurement of the coal consumption of the rotary by means of analysis of the exit gases.

Chapter II. The correct air supply for rotary cement kilns.

Chapter III. The laws of output from rotary kilns, calculated from physical data.

Chapter IV. The sizes of the clinkering zones of cement rotary kilns necessary for a given output, calculated from thermo-dynamical data.

Chapter V. Calculation of the size of the decarbonating zone from thermo-dynamical data.

Chapter VI. The dimensions of the rotary kiln, including rates for finding their lengths and diameters, and sizes of the decarbonating, preheating and drying zones of both wet and dry process kilns.

Chapter VII. Temperatures at which calcium and magnesium carbonates decompose in the cement rotary kiln.

Chapter VIII. Determination of the quantity of heat required to decompose 1 lb. of calcium carbonate at the temperatures prevailing in a cement rotary kiln.

Chapter IX. Calculation of the quantity of heat absorbed in making 1 lb. of portland cement clinker.

Chapter X. Calculation of the quantity of gases of combustion and air quantities required to make 1 lb. of clinker.

Chapter XI. The specific heats of the gases of combustion at high temperatures.

Chapter XII. Calculation of the theoretical flame temperatures of the rotary cement kiln.

Chapter XIII. Flame temperatures obtained in practice in the cement rotary kiln.

Chapter XIV. Weight of clinker producible using combustion gases of different flame temperatures and supplying 10.478 lb. of air per 1 lb. of standard coal burned.

Chapter XV. For fuel economy it is essential to utilize high grade heat for high grade thermal work and low grade heat for low grade thermal work.

Chapter XVI. On the preheating of the entering air by means of hot clinker.

Chapter XVII. Proof that the clinker output per 1 lb. of coal burnt is greatest when the flame temperature is highest and that the output of clinker must diminish when air in excess of 10.478 lb. per 1 lb. of standard coal is supplied to the kiln.

Chapter XVIII. Weights of dry slurry used and weights of carbon dioxide and moisture expelled therefrom in producing different weights of clinker.

Chapter XIX. Calculation of the exit temperatures of the gases from a perfect rotary kiln, using incoming air preheated to different temperatures by the outgoing clinker, no external or internal radiation losses occurring.

Chapter XX. Loss in clinker output due to external radiation losses from a modern rotary kiln.

Chapter XXI. Loss in clinker output due to internal radiation losses from a modern rotary kiln.

Chapter XXII. Effect of internal radiation and convection on slurry moisture, showing that within certain limits the percentage of moisture in a slurry may be varied without altering the fuel consumption per 1 lb. of clinker.

Chapter XXIII. Calculation of the amount of water which can be retained in the slurry so as to allow the exit gases to escape from the rotary kiln at 212 deg. F. (100 deg. C.) on the supposition that all external radiation from the kiln shell is stopped.

Chapter XXIV. Calculation of the amount of water which can be retained in the slurry so as to allow the exit gases to escape at 212 deg. F., allowing for the ordinary external radiation losses which occur in a modern rotary kiln.

Chapter XXV. Calculation of the exit temperatures of the gases from rotary kilns when the slurry moisture varies between 0% and 40% but the entering air is preheated to various degrees, allowing the same external radiation from kiln shell as occurs in an ordinary rotary kiln.

Chapter XXVI. Calculation of the amount of steam producible per 100 tons of clinker in the rotary kiln, together with a discussion of the waste heat boiler.
Case a—When slurry moisture is 40%.
Case b—When slurry moisture is 0%.

Chapter XXVII. The design of waste-heat boilers for cement rotary kilns.

(To be continued)

The Place of the Combustion Engineer in the Cement Industry

By V. K. Fischer
Combustion Engineer, Trinity Portland Cement Co.

MUCH CREDIT IS DUE the veteran cement kiln operators whose practiced eyes have for so long determined the proper burning conditions in producing good clinker. It is therefore with no thought of detracting from the excellent reputation of the kiln operators that we now call attention to the inadequacy of the human eye as representing the best means of controlling combustion in the rotary cement kiln.

It has been found that differences which simple visual examination cannot detect are of significant importance in the economical operation of cement kilns. Men who have observed the combustion phenomena connected with the making of cement admit that refined scientific control methods are desirable adjuncts to the process of clinker production.

So it has come to pass that the combustion engineer has come into the cement industry as fuel economist and heat conservationist. His first duty lies clearly in the field dominated by the scientific consumption of fuel, but inasmuch as calorific computations figure in other departments also, he may easily become involved in many additional problems, such as the useful application of waste heat in the flue gases to profitable service. Then, too, radiation losses also come under his consideration in the study of proper insulation of kiln shells.

To elaborate on the matter of combustion control it may be pointed out that flue gas analysis, with all the ramifications associated with different types of fuels, constitutes part of the daily routine of the combustion engineer. He co-operates with the kiln operator in adjusting the fuel-air ratio and in regulating the draft at the stack.

Such detail can be ultimately delegated to any one of the qualified laboratory personnel. A major problem remains in the investigation of the relationship between the type of burner in use, the design of the kiln, and the best arrangement of the air supply, both primary and secondary.

With reference to the air supply, the engineer is confronted with cooler construction if heat recovery from the clinker is part of the operating scheme. In this connection there is the matter of fans and possibly a dust eliminator to take into account before the preheated air is available for combustion in the kiln. Obviously, the necessary computations center around the temperatures and corresponding air volumes in particular instances.

Utilization of heat from exit gases draws

V. K. Fischer

attention to the development of the waste heat boiler, which automatically takes care of the largest part of heat available in flue gases. In this situation the combustion engineer acts as sort of an intermediary between the kiln department and the power house.

The best interests of one department appear to coincide with those of the other when the kilns and the boilers depend upon a common source of heat, and, in so far as this is true, there is no occasion for special combustion procedures other than what has been already indicated as suitable for correct kiln operation.

The growing interest in slurry filters affords still further opportunity for the combustion engineer to exercise his talents when his assignment includes a wet process plant. In this instance he is called upon to furnish figures showing the calorific advantages, if any, under proposed changes.

At dry process plants he has supervision of the rock drying equipment, involving similar details as in kiln practice. It is not amiss to assume that the combustion engineer should likewise be qualified to discuss the relationship of chemical variations in kiln feeds from the standpoint of their respective requirements, and he should know the effect of various fuels on the kiln product, notably the effect of the residual ash when the kiln is fired with coal. In case gas is the fuel in use he should be able to comprehend the metering problem as a guide in checking kiln efficiency.

Such, in general, are high spots in the daily work of a combustion engineer.

General Refractories Buys Into Northwest Magnesite— To Make Board

THE General Refractories Co., New York City, has acquired a substantial interest in the Northwest Magnesite Co., manufacturer and distributor of fireproof insulating board, according to an Associated Press dispatch from New York City.

A local newspaper story (*Sandpoint*, Idaho, *North Idaho News*) gives the following details on the board manufacture:

Thermax, the magnesite board manufactured by the Northwest Magnesite Co. at Chewelah, Wash., is a new product which seems destined to make the town famous. Not since the war, when crude magnesite was being hauled from the district, has there been such activity in Chewelah. The teams of 15 or more contractors are drawing on the forests in many directions for timber which is used in the preparation of the new material.

The initial requirement is about 4,000,000 ft., of which about one-half has been delivered. The wood and the rock will be broken into fine parts and joined in a pulp that emerges as board of different dimensions for use in the construction of buildings and other purposes. The use of any size of timber minimizes its cost. The magnesite is a non-conductor of heat or cold.

It is the inexpensiveness of the new product and this imperviousness to temperature, that is expected to make it popular in its use in construction work. In the preparation for market, the raw materials pass through ponderous machinery and other equipment, including ovens 120 ft. long.

Before engaging in the manufacture at Chewelah, managers of the company producing Thermax studied the manufacture of a similar board in Austria. Much of the equipment was also made in that country and is being installed by the Austrian engineer. The plant which it is expected will by producing early in July will give employment to 75 people.

The interests in the Northwest Magnesite Co. are largely those identified with the Bunker Hill & Sullivan Mining and Concentrating Co., Treadwell, Yukon and other large mining organizations, of which Fred W. Bradley is the moving spirit.

The Manufacture of Gypsum Plasters

Part I—Leaves from an Operating Man's Note Book

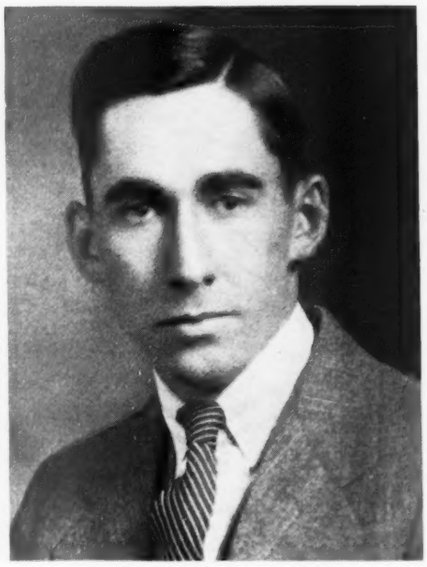
By A. M. Turner, E.M.
La Veta, Colo.

WHEN W. B. Lenhart, now an associate editor of Rock Products, ran a series of articles in that magazine on "The Manufacture of Gypsum Plasters," the writer read them with keen interest. Recently I have again carefully studied his deductions and although I find the information the best I have yet read on the subject, there are some conclusions which differ quite radically from my own experience. This difference lies principally in the fact that our work has been with gypsum in different localities. These differences as well as some other comments I have made relative to Lenhart's work may also interest the readers of Rock Products.

His description of the elemental sulphur occurring in the gypsum rock is particularly interesting because this element is restricted to probably a limited number of gypsum deposits. Gypsum is a sedimentary deposit and sulphur is of igneous origin, so it would appear that the two types of formation must be in some way closely associated. In this connection it is extremely interesting to learn from other sources that overlying certain gypsum deposits in California is a rock formation which resulted from flowing lava. This formation, while rather unusual, could easily account for the presence of elemental sulphur, as the heat of the molten rock would melt sulphur out of the gypsum. A still greater freak occurrence is the fact that as a result of the hot lava flowing on to it, the gypsum completely dehydrated the mineral, forming what we might term natural Keene's cement or artificial anhydrate.*

Effect of Grinding on Quality

Further on in his articles Lenhart mentions that the type of grinding equipment used has no particular advantage from a quality standpoint. This statement can be contradicted, as it has been found that grinding plays an important part in influencing the quality of products made from gypsum of certain deposits. It is true that gypsum from different localities, if treated by exactly the same process, does not give the same quality product. The consistency may vary, sand carrying capacity be very different, and the working qualities often are vastly dissimilar. In cases where the gypsum does not make a desirable quality product it can often be improved by grinding the calcined stucco in a tube mill; that is, assuming the original grinding process has been done with buhr stones. The theory that tube mill grinding gives a better product, is because the grinding produces flatter particles and the plaster will have a more flour-like texture, which greatly improves its working qualities on the job.



A. M. Turner

Rabble Arms of Calcining Kettles

In Part II of Lenhart's "The Manufacture of Gypsum Plaster" a paragraph has been headed, "Rabble Arms," and discusses their primary function as being that of scraping the kettle bottom clean, and preventing the ground gypsum from piling on the flues where it will not properly calcine and eventually damage the quality of some stucco. There is a very important economic factor connected with rabble arms which may be well worth discussing at this time. These arms are made of flat iron and attached to the kettle shaft in such a way that they are at an angle with a horizontal plane. The size of this angle determines the resistance they encounter when agitating a kettle of gypsum, and to a large extent are the controlling factors for the amount of power required to pull the kettle machinery. If the angle of these arms is too great it is entirely possible that they will be the cause of sticking a kettle under a heavy load, that would not have stuck had the arms been practically horizontal. This condition is one well worth the consideration of plaster-mill operators.

Thermometers

Since Lenhart made no mention of the kind of thermometers used, or where they are installed in kettles, I wish to express some views which are somewhat different from ordinary practice. Usually either long stem mercury, or gas type recording thermometers are inserted through the top of the kettle and extend into it for a distance of 4 or 5 ft. If the tube does not extend down to the top of the upper rabble arms the thermometer should be located about half way between the shell and the shaft. Otherwise the bulb must be suspended close to the kettle shell so it will go between the shell and the end of the rabble arm.

The latter method is objectionable for two reasons. First of all, the temperature recorded, before the ground gypsum in the kettle has reached the height of the bulb, is that of the hot air and steam above the gypsum and not the true temperature of the kettle contents. Second, when the kettle is dumped the intense heat from the shell next to the bulb is so great that it may damage the thermometer. In the event the thermometer is placed nearer the center of the kettle the same objection applies as the first one mentioned above.

The above objections need not exist if the tube of a recording thermometer is inserted in an iron pipe and installed in the front side of the kettle near the bottom. The end of this pipe should be sealed with the exception of a hole in the center just large enough for the thermometer bulb to protrude. This bulb should extend about 6 or 8 in. beyond the pipe. A protecting guard of heavy wire may be built from the end of the pipe around the thermometer bulb if necessary. The pipe and bulb are then inserted through a hole in the front side of the kettle walls into the kettle. The bulb should be located about 20 in. from the kettle shell, and approximately half way between the bottom flues and kettle bottom.

This installation facilitates recording the true temperature of the kettle contents practically from the time the fill is started. Another advantage is that the thermometer stem (and cable) is well isolated from the moving parts in connection with the kettle as well as from the workmen. Fig. 1 shows a sketch illustrating the relative position of

*Sulphur is often associated with gypsite beds, a phenomenon that will not appear so unusual when it is recalled that gypsite is an evaporation product of gypsum-bearing ground waters that have evaporated after reaching the surface. Soluble sulphides and gaseous sulphides, H_2S, etc., are often found in such waters and would point to the origin of the elemental sulphur.—W. B. Lenhart.

the thermometer installed in the kettle as described above.

Comparisons of Gypsite and Gypsum Plasters

On page 8 of Lenhart's article I criticize the statement made that gypsite plasters are recognized as making stronger walls than gypsum plasters. This belief is no doubt founded upon the reason that less sand is mixed with the so-called "dirt" plaster than with "rock" plaster. Were the two to be mixed with equal amounts of sand the gypsum plaster would no doubt make the stronger wall. Concerning gypsite plaster, an interesting fact is that it is a product which might be termed naturally aged, and therefore practically no change takes place in gypsite plaster after it has been manufactured. The writer recently tested some gypsite plaster 20 years old and found it had practically the same set, strength, consistency, and working qualities as freshly made material of the same formula.

Comparing gypsite plaster with that made from gypsum the outstanding characteristic which differs radically in the two is that the dark plaster keeps indefinitely without deterioration, while rock plaster begins to age within a few months' time. "Dirt" plaster works more easily than that made from the rock on account of the nature of the impurities which it contains. In favor of the white plaster is the fact that it carries considerably more sand than its dark sister.

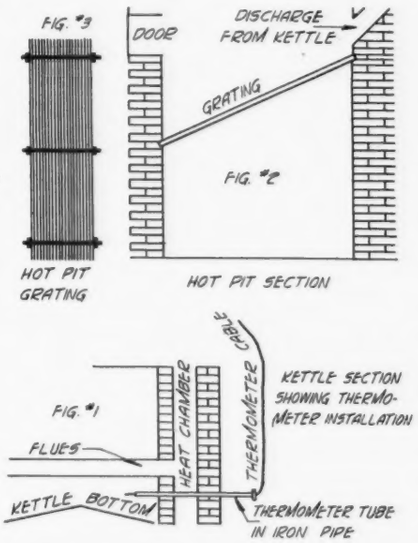
Emptying the Hot Pit

Again, on page 8 of the Lenhart article, reference is made to methods of using either screw conveyors or man power for emptying the stucco from hot pits. A method superior to either of those mentioned is to build chutes from the hot pits into the master conveyor. These chutes should be placed in the hot pits at frequent intervals and the inside of the pits can be shaped so that the stucco flows freely to the openings. Gates are provided in the chutes to regulate the flow of the calcined gypsum. A safety precaution which prevents the stucco from forcing through the master conveyor and flooding the elevator is to use a double flight conveyor. Hot stucco works through this system nicely, and a saving results by eliminating the power necessary to run the hot pit conveyors and dispensing with repairs on machinery.

Removing Tramp Iron, etc.

While speaking of economics at this point of the operation, here is a suggestion which might be given to relieve the minds of many calcining mill superintendents. Foreign material such as iron and wood that gets into the kettles and hot pits causes endless trouble in the conveying system.

This trouble can be practically eliminated by placing a grating made of flat iron directly under the kettle gate discharge and having it laid on a slope to the opposite side of the hot pit. This grating can be made of flat iron ¼ in. by 2 in. spaced about ¾ in. apart. The width of the grating will be roughly 2 ft. Fig. 2 shows the relative position of this grating in the hot pit, and Fig. 3 is a plan view of the grating. Rods passed through holes drilled in the flat iron hold the equipment together. The strips of iron may be spaced at the desired intervals by use of washers or nuts slipped over the rods. In most cases spikes, sticks, bolts, and iron of various descriptions which get into



Figures used in Mr. Turner's article. Fig. 1 illustrates relative position of thermometer installed in kettle through hole in front side of kettle wall. Fig. 2 shows relative position of grating over the hot pit and Fig. 3, a plan view of the grating

the stucco will be caught on the grating and can be removed at convenient intervals.

How Plaster Sets

The last exception we are going to take to what Lenhart has written is in regard to his description in Part VIII of his article of the way plaster pats set, beginning from the middle and finally the outer surface setting last. In our experience we have often seen patties set first on the outside edges and sometimes harden uniformly throughout. The difference is probably caused by a variation in testing methods.

While we have differed in some phases with the work described by Lenhart under the heading of "The Manufacture of Gypsum Products," we attribute the variation principally to the fact that there is a great dissimilarity in the response of gypsum from different deposits to the same treatment, and that gypsite and gypsum cannot be handled as parallel subjects.

In conclusion, we will issue the warning that each gypsum deposit and every gypsum mill presents a distinctly different problem from any other, and in many respects there is no fixed rule to apply for methods in the gypsum industry.

(To be continued)

A Practical Method of Controlling the Quartz Content of Feldspar

IN THE MANUFACTURE of white ware the control of the free quartz content of feldspar in order to maintain a uniform quality of ware has become more important, particularly where lower grade feldspars have had to be used. In some cases it has been found advisable to put the feldspars into different bins and after chemical analysis blend them to obtain a uniform product. Such chemical analyses require considerable time and are expensive.

An alternative method which is simple and inexpensive, and one which the author believes sufficiently accurate, is suggested in a paper presented by Joseph B. Shaw, head of the Department of Ceramics, Pennsylvania State College, at the February, 1930, annual meeting of the American Ceramic Society at Toronto, Ont. This method requires less than an hour as against two or three days for a complete chemical analysis.

The method is to crush 200 grams of the feldspar to pass through a 4-mesh screen and then place on a piece of black paper that part of it remaining on a 10-mesh screen. Such crushing almost completely separates the quartz grains from the feldspar grains. The quartz grains are then carefully picked out with tweezers, weighed and the percentage of free quartz calculated. As a check, the true specific gravities of the quartz, feldspar and the mixture should be determined, and the percentage of free quartz.

In checking the method it was found that the actual free quartz content as obtained by weighing the 4-mesh to 10-mesh sizes should be increased 10% to allow for the greater percentage of quartz in the minus 10-mesh material.

The results of checking the method against chemical analyses showed a variation of less than 2% and indicated that practically as close results in the finished product were obtained in this way as by blending on the basis of complete chemical analysis.

Chromite in 1929

COMMERCIAL SHIPMENTS of domestic chromite in 1929, according to the United States Bureau of Mines, Department of Commerce, totaled 180 long tons, valued at $3,226, compared with 660 tons, valued at $14,807, in 1928. These shipments in 1929 were all from California. Sample lots from Georgia and Montana were shipped for test but did not prove to be of commercial value.

The imports of chromite into the United States in 1929 established a new record for all time and amounted to 317,630 long tons, valued at $2,666,488, compared with 216,592 tons in 1928 and 222,360 tons in 1927, the previous record year. Of the imports in 1929, 184,926 tons is credited to Africa, 52,949 tons to Cuba, 26,846 tons to French Oceania, and 26,647 tons to Greece.

Titrometric Determination of Magnesium*

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MAGNESIUM has been determined titrometrically in the presence of calcium by the use of the hydrogen electrode (2, 4), with trinitrobenzene as indicator (7), and in 66 to 75% alcohol solution with thymolphthalein as indicator (9). In the absence of calcium, magnesium has been determined by precipitation of the hydroxide with excess alkali, separation of the precipitate and solution, and titration of the excess alkali in an aliquot of the solution (3, 8). However, in the presence of a high concentration of calcium salts this method fails unless some means is used to indicate the completeness of precipitation of magnesium, for on the addition of more alkali calcium also is precipitated.

Since calcium is associated so frequently with magnesium in nature and in manufactured products, and since the determination of magnesium in such mixtures often is very important, there is need for a practical, rapid, convenient, and fairly accurate laboratory method for the determination of magnesium in the presence of calcium. Direct titration of a neutral solution with alkali, using trinitrobenzene as indicator (7), gives results accurate enough for most control work, but requires a matching of colors. The method worked out in this laboratory for the determination of magnesium in cement (6) gives fair results, but the filtration and washing of the gelatinous precipitate of magnesium hydroxide is tedious if this precipitate is large. Also, if the time required for this operation is long, there is danger of adsorption of carbon dioxide from the air and precipitation of calcium carbonate with the magnesium hydroxide.

Since the time factor determines the value of analytical procedures in industrial laboratories, the work on magnesium was continued so that the tedious filtration could be avoided and the method made more universal.

In this work magnesium is precipitated as the hydroxide, with standard carbonate-free alkali. When the end point for trinitrobenzene (a dark brick red) is obtained, the calcium remains in solution. The solution containing the precipitate is diluted to a definite volume, an aliquot filtered, and the excess alkali titrated.

The accuracy of this method depends, not on the sharpness of the break of the neutralization curve in the titration of magnesium with alkali, but on the completeness of the precipitation of magnesium, with calcium remaining in solution, and the end point when the excess alkali is titrated with acid. This end point is around a pH of 4, and is quite definite. Kolthoff (4) states that calcium hydroxide does not precipitate in 0.01 *N* sodium hydroxide and in this work its concentration does not become half so great.

*Reprinted from *Industrial and Engineering Chemistry*, April 15, 1930.

Experimental Procedure

The following procedure for limestone, with slight modification, may be used for many substances containing magnesium.

Dissolve sample of 0.500 gram in about 50 cc. of 0.25 *N* hydrochloric acid, boil out carbon dioxide, add 5 or 6 drops of 0.04% alcohol solution of bromothymol blue, and add alkali until a blue color, indicating neutrality, is obtained. Filter and wash the precipitate, catching the washings in the same beaker as the original filtrate. To the filtrate add 5 drops of 0.1% alcohol solution of dimethylaminoazobenzene and 0.25 *N* hydrochloric acid to the appearance of a faint pink. Add 10 cc. of a saturated alcoholic solution of trinitrobenzene and titrate with 0.25 *N* carbonate-free sodium hydroxide (B_1) to the appearance of a deep red color. Transfer the solution to a 100 cc. volumetric flask and continue titration, if necessary, to hold the deep red color. Dilute to 100 cc., mix, and filter through a dry filter paper into a dry beaker, keeping the funnel covered with a watch glass as much as possible. Pipet 50 cc. of the filtrate and add an indicator which at a pH of about 4.0 has a color change easily recognizable in a reddish solution. Titrate with 0.25 *N* hydrochloric acid (A_1) to the color change of the indicator.

A sufficiently close approximation of the per cent. magnesium oxide is as follows:

$$B_1 - 2A_1 = \text{per cent. MgO}$$

Solutions of samples containing no cation whose hydroxide is insoluble at neutrality are treated as in the neutral filtrate mentioned above.

LIMESTONES

	MgO present	MgO found
Sample 1	1.0%	1.0%
Sample 2	4.0%	4.1%
Sample 3	16.8%	16.7%

TECHNICAL SALTS OF MAGNESIUM CHLORIDE

	Mg present	Mg found
Sample 4	7.4%	*7.4%
Sample 5	12.2%	12.4%
Sample 6	23.8%	23.5%

*Contains $CaCl_2$.

With the same samples the magnesium was determined as described in the article on the determination of magnesium in cement (6). Satisfactory data were obtained, but the method is much longer than the one given above.

Instead of filtering an aliquot of the solution above, the sample may be centrifugal after precipitation of the magnesium hydroxide and a sample for analysis pipetted. If a large number of samples are to be run in which the magnesium content is not very high, it may be advantageous to place each solution, after dilution to 100 cc., in a tall cylinder to allow the precipitate to settle, and to pipet a sample of the supernatant liquid for titration.

Discussion of Method

Bromophenol blue was used as indicator for obtaining the data given above. This is a satisfactory indicator if an aliquot of the alkaline filtrate is titrated right away. Trinitrobenzene in alkaline alcoholic solution readily changes to some compound which retains a distinct red color after acidification. In such a solution the color change of bromophenol blue cannot be detected easily. Congo red is a satisfactory indicator in such cases, and good results were obtained by using it, for the change from red to blue-violet is detected with ease in the presence of a high concentration of the product from trinitrobenzene.

NOTE—Hepp (1) obtained a product with properties of a nitrated phenol by allowing an alcoholic solution of trinitrobenzene to stand for a short time with 2 mols of potassium hydroxide. Lobry de Bruyn (5) obtained 3,5,3',5'-tetranitroazobenzene and dinitrophenol by boiling trinitrobenzene with dilute sodium carbonate or by allowing the mixture to stand at room temperature for 3 days. Sodium hydroxide reacted similarly slowly at room temperature.

Neither Congo red nor bromophenol blue is as satisfactory as dimethlyaminobenzene as an indicator for adjusting the acidity before the initial titration. The red color of Congo red in alkaline solution interferes with the end point of trinitrobenzene. If the final titration is made with bromophenol blue as indicator, the end point is located more quickly if one is warned of its approach by the decrease in the depth of the trinitrobenzene color. The presence of bromophenol blue in the solution increases the difficulty of recognizing this point, so this indicator is not added until the solution is about neutral.

A slight error is introduced by using one indicator for the initial adjusting of the acidity of the solution and another for the final titration. The error thus introduced, however, does not exceed 0.1% of MgO.

Acknowledgment

Acknowledgment is made to the Dow Chemical Co. for the analyzed samples of magnesium chloride salts used.

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Diatomite as a Concrete Admixture Material

An Unbiased Investigation of Several Diatomites Leads to the Conclusion That Their Use Is Generally Beneficial

By Elliott S. Hastings
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WITHIN THE PAST YEAR we have had many published reports and discussions of the efficacy of diatomite when used as an admixture in concretes and mortars, some favorable in their findings and conclusions, others distinctly and definitely unfavorable. The question evidently has in it all the elements for a first-class controversy, as one usually develops whenever the subject is brought up for public discussion. Far from indicating a decline of interest in this unusual material, this very definitely measures an active, intelligent interest; people are not given to extended discussion and argument in connection with a dead or dormant subject, and we may consider investigation and discussion of diatomite and its action in concretes timely and logical.

There are two schools of thought concerning the use of diatomite as an admixture in concrete, one maintaining that it is injurious and should be discontinued, the other as stoutly maintaining that it is beneficial in its effect, and should be continued in use. Both schools having presented data to support their contentions, and all of these data apparently being authentic, it remains to be seen whether or not the same bases of comparison and analysis have been used in reaching the contradictory conclusions.

In any subject involving so many variable factors as this, it is patently unsafe to dismiss the question with a single broad statement; to say that diatomite is or is not injurious in its action in concrete without defining the conditions under which such effect or action was noted, and without supporting the statement by preponderance of evidence, is to invite challenge for proof that might become embarrassing. We know that such preponderance of evidence is not in existence at present, for there has not been sufficient research to produce this evidence; we also know that four such variable factors as cement, sand, fine and coarse aggregates, with their different and variable chemical and physical characteristics, locality of origin and conditions of use can and do give results that are as far apart as the poles of the earth; add a fifth ingredient, diatomite, and the need for the definite standards of comparison before approving or condemning the admixture material should be obvious.

Much progress has been made in reducing the four concrete ingredients to definite standards, and the improvement in quality of concrete has quickly and definitely measured the value of this work; the same standardization methods must be applied to diatomite before we can be in position to say anything about its value as an admixture material with any degree of authority.

Editor's Note

WE BELIEVE we are violating no confidences (and it certainly adds interest to the article) to quote from a letter from the author to the editor in which the author says: "The data gathered showed the relations described in the article rather clearly, but as to whether those relations and results are end processes of a series of reactions in the cement itself, or combined reactions of the cement and other concrete ingredients, I frankly do not know, and I would not feel confident in saying that it was the one or the other, from my work. . . . It seems to me that a competent cement chemist could do more with this in two months than the rest of us in a year, for he has the cement laboratory and can vary conditions in the cement over wide ranges. My experience with the cement chemist has been that he is rather indifferent concerning the part played by diatomite, and my thought is that some morning he is going to wake up and find that the procession has passed him by!"

We might add that the foregoing comment was elicited by our own suggestion in a letter to the author that the proper way to use diatomite, if it is desirable to use it at all, is to incorporate it with the cement—as a cement admixture rather than as a concrete admixture. The author amplifies this subject by stating: "It may appear surprising, but there is a radical difference between simply mixing the diatomite with the cement after the cement has been ground, and mixing the diatomite in at the finish grinding operation. . . . We have only scratched the surface as far knowing anything about the material and its properties are concerned."—The Editor.

Cement Chemist Should Help

As this subject is so closely allied to cement and its chemistry so closely parallels cement chemistry, it seems that we should get much helpful information from the cement chemist; that we have not up to the present time may be due to several factors, not the least of which is the disinclination on the part of the average cement chemist to interest himself in what to him is but an unimportant phase of his vocation, as well as plain lack of the necessary time and funds to make such investigations as will show the existence of pertinent and important factors.

The necessary funds and time would be forthcoming quickly enough if it were realized that the growth of use of diatomite as a concrete admixture has come from the user—the customer of the cement manufacturer—who has learned that the use of diatomite in concrete gives the concrete some qualities that it does not possess when the diatomite is omitted. The time and effort expended by cement manufacturers and allied associations in improving the technique of cement manufacture and use has demonstrated the importance attached to determination and control of factors governing the quality of concrete; the next logical step, if the subject is not to be dismissed at this point, is to learn what are the elements or factors that give concrete containing diatomite this extra quality, and to evaluate them.

Granting unbiased belief and sincerity on each side, the statements made regarding the use of diatomite in concrete are so opposite in nature that one is forced to think that there must be some factors involved that have been more or less ignored.

Tests With Not One But Several Diatomites

With this in mind, several representative diatomites were selected for use in series of tests. In these tests, care was exercised at every point to reduce the personal equation with its possible source of error to a minimum, using a cement noted for its general uniformity of action, using sand, fine and coarse aggregates of constant screen moduli, moisture content, and the like—all to the end that such differences in character and

TABLE 6. CALCINED DIATOMITE, SANTA BARBARA COUNTY, CALIFORNIA

Mix—1:2.5:3.5
Water cement ratio—1.00
Cylinders 6 in. x 12 in.

	Plain.		1½% diatomite added by wt. of cement.		3% diatomite added by wt. of cement.	
	7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
	1349	2462	1743	3050	1852	3176
	1393	2501	1782	3112	1823	3122
	1356	2478	1760	3086	1890	3218
	1350	2479	1810	3123	1807	3187
	1321	2430	1822	3147	1796	3139
	1329	2428	1771	3096	1830	3150
Average	1349	2463	1781	3102	1833	3165

Chemical analysis:

Silica	77.88%
Alumina	11.54%
Iron oxide	6.32%
Lime	1.86%
Magnesia	Trace
Moisture	5.50%
Loss on ignition	2.19%

A more or less surprising fact brought out in the foregoing data is that the general purity of the diatomite, as measured by the silica content, does not have the important bearing on compressive strengths of concrete in which the diatomite is used that we have previously ascribed to it; inspection of the various tables will show that the diatomite with the highest silica content does not improve compressive strengths of the concrete in which it is used as much as one would expect in the light of present information on the subject.

Inspection of the various chemical analyses to determine other possible elements that may disclose significant relations will show that the total iron oxide and alumina contents of the diatomites have a fairly direct relation to the compressive strengths of the concretes in which the diatomites were used. Arranging the data in slightly different form, we have:

TABLE 7. RELATION OF TOTAL ALUMINA, IRON OXIDE CONTENTS TO COMPRESSIVE STRENGTH

Total alumina, iron oxides	Table 1. 2.40%	Table 2. 2.68%	Table 3. 5.49%	Table 4. 7.97%	Table 5. 11.80%	Table 6 17.86%
Compressive strength						
7 days:						
Plain	1089	1196	1290	1387	1363	1349
1½% Diat.	1209	1222	1465	1511	1739	1781
3% Diat.	1292	1424	1736	1792	1765	1833
28 days:						
Plain	2165	2215	2461	2513	2464	2463
1½% Diat.	2343	2314	2514	2607	2895	3102
3% Diat.	2515	2636	2954	2980	3062	3165

Expressing these relations in terms of percentage increases in compressive strengths of concretes containing diatomite over plain concrete, expressing strengths of plain concrete as 100%, and considering only the 28-day strengths, we have:

TABLE 8. COMPARISON OF DIATOMITES IN COMPRESSIVE STRENGTHS OF CONCRETE BY PERCENTAGES

Diatomite	Total alumina, iron oxide	Increase in compressive strengths 3% diatomite added
Table 1	2.40%	16.00%
Table 2	2.68%	19.00%
Table 3	5.49%	20.00%
Table 4	7.97%	19.00%
Table 5	11.80%	24.00%
Table 6	17.86%	28.00%

This apparent relation of the alumina and iron oxide components of diatomite to increased compressive strengths of the resultant concrete as compared to plain concrete made under identical conditions is somewhat at variance with the present belief that the addition of iron and alumina, especially alumina, in any of their forms to portland cement results in no appreciable change in the characteristics of the concrete. It has been frequently stated that the iron and alumina, to be of value in cement, must be added to the lime slurry before burning to clinker. Certainly the French high alumina cement, as well as some domestic brands, have had the alumina added before the clinkering process; as to whether or not iron oxide and alumina are present in portland cement in forms identical with these same ingredients in diatomite it is impossible to say; it does appear, however, that they are present in such form as to react readily in concretes in which the diatomite is used.

The writer's experience with diatomite used as an admixture material has been that in no case under observation has the compressive strength been less than that of plain concrete of the same mix and water cement ratio, and made under similar conditions. Diatomites from almost every known commercial deposit have been used; mixes commonly used in all classes of building construction have been tested over an extended period of time, and the net result of all observations and tests has been as stated. Such statements of resultant decreased strengths as have been made to the writer have been found, on investigation, to be due to conditions under which the concrete had been mixed and poured, and not to any deleterious effect of the use of diatomite.

The manufacturers of portland cement have been to very considerable trouble and expense, in the past few years, to acquaint the public with the technique of the use of cement; it will be remembered that the early users of cement secured some very surprising and unexpected results because of unfamiliarity with cement. The development of the water-cement ratio law is one good example of the effort expended to enable users to secure uniformly good results from the proper use of concrete. It is a fact, unpalatable but true, that as little is known about diatomite at the present time as was known about cement in the early days of its use, and it is just as true concerning diatomite as concerning cement that knowledge of the proper conditions and methods of use will secure uniformly beneficial results.

Workability as Important as Strength

In the foregoing, the discussion has been more or less confined to effects of addition of diatomite to concrete on compressive strengths. It has been demonstrated clearly in the cement field that variations in the water-cement ratio provide a means of regulating compressive strengths of concrete over a rather wide range, in which case it is a matter of economics as to whether the desired strength should be secured by use of the proper amounts and type of diatomite or by regulation of the water-cement ratio. However, it does not seem that improvement in compressive strength is the only effect desired of diatomite; such factors as reduction of laitance, efflorescence, increase in general ease of handling, improvement in workability, and the like, are sought fully as much and as often as the improvement in compressive strength.

Such tests as have been made by the writer on the action of diatomite in reducing the amount of laitance and efflorescence in various concretes have shown a more or less direct proportion of amount of silica present in the diatomite to reductive effect. This is probably due to the fact that in the diatomites containing greater amounts of amorphous silica more of this silica is available for reaction with hydrated lime liberated from the cement, thus reducing efflorescence, while the natural absorptive power of the diatomite prevents laitance.

Mixing, handling, pouring and like operations are more or less mechanical in nature, affected and controlled by internal lubrication of the concrete mass. While investigations of these factors have not progressed sufficiently to permit of evaluation according to some arbitrary scale, enough work has been done to show the existence of a definite relation between particle size and shape and lubricative effect, or workability.

The term workability, much maligned, often loosely defined and used to cover a multitude of technical sins, is considered by the writer to cover all those factors that

strength of the concrete specimens as should appear would measure differences in effect and behavior of the diatomites used.

The accompanying photomicrographs, numbered serially to correspond with the tables of compressive strengths of the same material, represent average photomicrographic fields of the diatomites investigated. The Nevada diatomite, Fig. 1, is of fresh water origin, all others shown being of marine origin. It will be noted that the Nevada diatomaceae are somewhat smaller in size than those of marine origin, due, no doubt, to the fact that in the fresh waters in which the diatomaceae existed, soluble silica (plant food) was present in smaller amounts than in salt waters, and the diatom growth reflected this condition.

Compressive strength tables of both plain concrete and concrete containing percentages of diatomite indicated at 7- and 28-day periods are analyzed by the figures shown in Table 1. All strengths are expressed in pounds per square inch.

TABLE 1. NATURAL NEVADA DIATOMITE

Mix—1 :2.5 :3.5
Water cement ratio—1.00
Cylinders 6 in. x 12 in.

Plain.		1½% diatomite added by wt. of cement.		3% diatomite added by wt. of cement.	
7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
1120	2209	1383	2501	1247	2307
1080	2160	1144	2163	1356	2461
1132	2230	1263	2331	1301	2382
1100	2180	1085	2243	1238	2567
1060	2100	1042	2066	1136	2391
1044	2113	1339	2755	1475	2984
Average.....1089	2165	1209	2343	1292	2515

The chemical analysis of this diatomite follows:

Silica	95.50%
Alumina	0.60%
Iron oxide	1.80%
Lime	0.87%
Magnesia	0.51%
Titanium	.....
Moisture	8.37%
Loss on ignition	0.72%

TABLE 2. NATURAL DIATOMITE FROM SANTA BARBARA COUNTY, CALIFORNIA

Mix—1 :2.5 :3.5
Water cement ratio—1.00
Cylinders 6 in. x 12 in.

Plain.		1½% diatomite added by wt. of cement.		3% diatomite added by wt. of cement.	
7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
1200	2260	1150	2358	1495	2667
1172	2187	1295	2316	1430	2679
1209	2207	1164	2262	1399	2634
1213	2223	1223	2287	1300	2571
1220	2241	1260	2334	1441	2622
1160	2172	1242	2327	1482	2643
Average.....1196	2215	1222	2314	1424	2636

Chemical analysis:

Silica	88.58%
Alumina	2.68%
Iron oxide	Trace
Lime	1.61%
Magnesia	1.30%
Titanium	0.29%
Loss on ignition	5.54%

TABLE 3. NATURAL DIATOMITE FROM LOS ANGELES COUNTY, CALIFORNIA

Mix—1 :2.5 :3.5
Water cement ratio—1.00
Cylinders 6 in. x 12 in.

Plain.		1½% diatomite added by wt. of cement.		3% diatomite added by wt. of cement.	
7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
1247	2407	1497	2438	1701	2918
1276	2432	1431	2414	1728	3007
1315	2504	1498	2504	1792	2833
1292	2460	1443	2543	1773	3035
1312	2491	1462	2587	1680	2910
1302	2473	1460	2600	1742	3022
Average.....1290	2461	1465	2514	1736	2954

Chemical analysis:

Silica	78.50%
Alumina	3.57%
Iron oxide	1.92%
Lime	1.06%
Magnesia	1.48%
Soda	0.97%
Potash	0.29%
Moisture	6.75%
Loss on ignition	5.22%

TABLE 4. NATURAL DIATOMITE FROM SANTA BARBARA COUNTY, CALIFORNIA

Mix—1 :2.5 :3.5
Water cement ratio—1.00
Cylinders 6 in. x 12 in.

Plain.		1½% diatomite added by wt. of cement.		3% diatomite added by wt. of cement.	
7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
1365	2493	1495	2560	1798	3062
1407	2560	1510	2609	1775	2850
1391	2507	1530	2643	1757	2827
1361	2486	1503	2600	1812	3073
1415	2571	1497	2574	1807	3057
1383	2459	1528	2660	1800	3013
Average.....1387	2513	1511	2607	1792	2980

Chemical analysis:

Silica	57.53%
Alumina	6.76%
Iron oxide	1.21%
Lime	0.78%
Magnesia	1.08%
Soda	Trace
Potash	Trace
Moisture	31.55%
Loss on ignition	0.84%

TABLE 5. CALCINED DIATOMITE, SANTA BARBARA COUNTY, CALIFORNIA

Mix—1 :2.5 :3.5
Water cement ratio—1.00
Cylinders 6 in. x 12 in.

Plain.		1½% diatomite added by wt. of cement.		3% diatomite added by wt. of cement.	
7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
1369	2430	1530	2526	1616	3031
1347	2447	1892	2795	1827	3067
1381	2500	1690	2920	1856	3146
1376	2477	1732	2992	1780	3040
1323	2440	1840	3130	1750	3014
1383	2493	1750	3010	1764	3073
Average.....1363	2464	1739	2895	1765	3062

Chemical analysis:

Silica	85.16%
Alumina	10.00%
Iron oxide	1.80%
Lime	1.16%
Magnesia	1.60%
Soda	Trace
Potash	Trace
Titanium	Trace

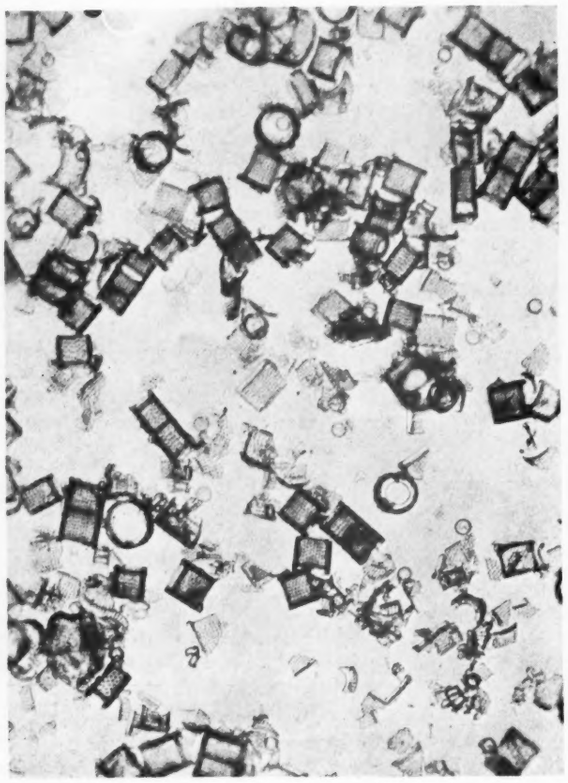


Fig. 1. Photomicrograph of a Nevada diatomite enlarged 300 diameters. Material dried and milled to 95% through 200-mesh screen. This diatomite is unique as regards its uniformity of particle size

Fig. 2. Photomicrograph of a well known California diatomite, taken at an enlargement of 200 diameters. Material has been dried and milled to 95% through 200-mesh screen

Fig. 3. Photomicrograph of a commercial diatomite of Los Angeles county, California, taken at an enlargement of 200 diameters. Material dried and milled to 95% through 200-mesh screen

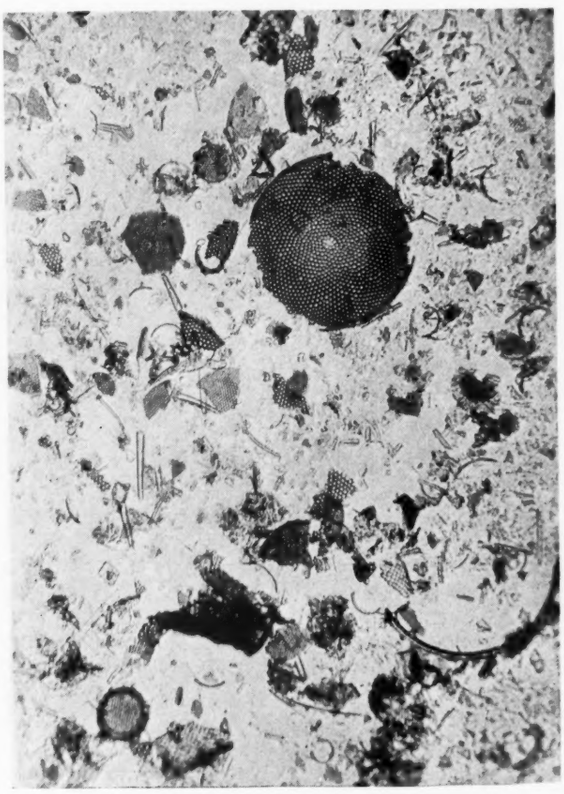


Fig. 4. Photomicrograph of a diatomite of Santa Barbara county, California, enlarged 200 diameters. Material dried and milled to 95% through 200-mesh screen

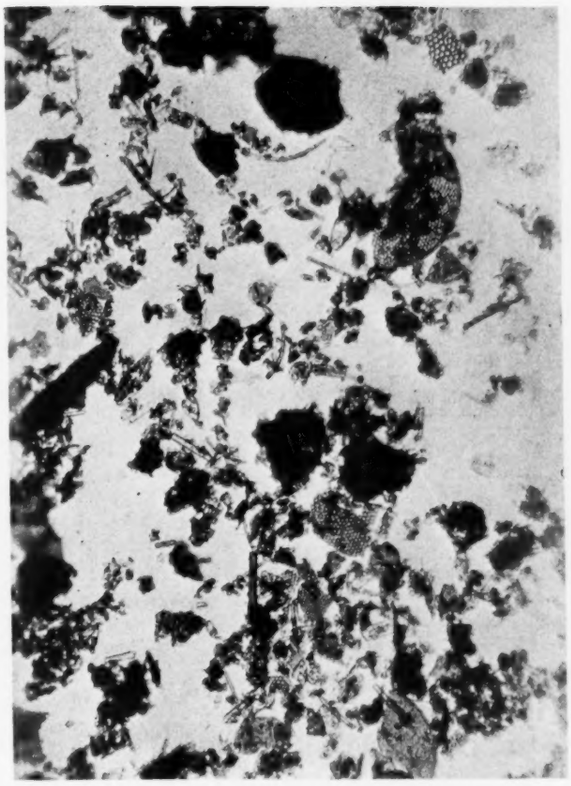


Fig. 5. Photomicrograph of diatomite of Fig. 4 after calcination at 1800 deg. F., taken at an enlargement of 200 diameters. Material milled to 95% through 200-mesh screen. All photomicrographs shown in this series have been reproduced at exact size of the originals

Fig. 6. Photomicrograph of a diatomite of Santa Barbara county, California, enlarged 200 diameters. This material originally impregnated with oil became ignited in prehistoric times with resultant calcination of material in place. Milled to 95% through 200-mesh screen for test purposes

make for ease of mixing, pouring, handling and placing of concrete—in other words, a term to describe the ease or difficulty of manufacturing and placing concrete on a job.

The same diatomites as were used in the tests previously described were analysed to determine what, if any, particle size differences existed in the material itself. Using apparatus hooked up in such manner as to practically eliminate all of the variable factors ordinarily encountered in minute particle size determinations, the various diatomites were examined in fields of 400 diameters enlargement and classified as shown in the table to follow. In Table 9 is expressed the percentage occurrences of the various particle diameters in terms of microns and, in the smaller sizes, theoretical screen sizes.

TABLE 9. PARTICLE SIZE DETERMINATION

Diameter, microns	140 to 74	74 to 46	46 to 30	30 to 15	—15.
Mesh screen	—100 + 200	—200 + 300	—300 + 500	—500 + 1000	—1000
Cement	23.50%	28.37%	4.45%	12.61%	31.06%
Diatomite, Fig. 1	.....	.....	.....	28.20	71.50
Diatomite, Fig. 2	18.46	17.80	4.28	20.66	38.79
Diatomite, Fig. 3	10.15	18.59	9.72	24.32	37.20
Diatomite, Fig. 4	16.27	25.08	10.11	19.86	28.48
Diatomite, Fig. 5	29.91	37.25	17.85	11.79	3.10
Diatomite, Fig. 6	19.43	38.14	33.50	3.21	5.62

The general result of these particle size investigations showed an apparent relation between the diatomites in which there existed considerable amounts of material of impalpable particle size and improvement of workability of the concrete mass in which they were used. Diatomites 1, 2 and 3 of the preceding table, for example, gave measured improvements in workability of excellence in the order named; from this it would appear that diatomites in which the precentage of particles of impalpable size were high might be expected to improve workability of a concrete mass to a greater degree than diatomites in which existent impalpables were lower in amount.

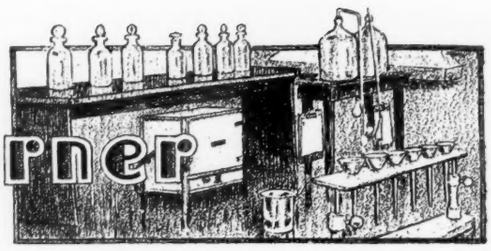
Any definite explanation of this would be premature at present; it is not the intent of the writer to state this relation as an incontrovertible fact as further research is pending, but results show that a relation exists. One possible explanation is that the more minute particles disperse more generally and intimately throughout the concrete mass during the mixing process and produce a greater lubricating effect; since the lubrication is a surface effect, and since the surface exposures of these impalpable particles are many times as great as the surface exposures of larger particles, it is to be expected that the lubricative effect, and therefore the improvement in workability, would be greater in the case of a diatomite in which these impalpable particle sizes predominated. Such has been found to be the case.

Summing up the investigations in a few words, it appears that the use of diatomite as an admixture in concrete is generally beneficial; that, used intelligently and in proper amounts, with the ingredients used in concrete under proper control, the use of small amounts of diatomite will act to increase compressive strengths of concrete as compared to similar concrete in which no admixture is used; that the use of diatomite greatly reduces efflorescence and kindred actions resulting from the liberation of hydrated lime from the cement and its existence in the concrete in free and uncombined state; that the use of diatomite of the proper physical characteristics will secure marked increases in ease of mixing, pouring and handling of the concrete; and finally that general workability conditions will be greatly improved.

Find Barite in Sardinia

A DEPOSIT of barite found in Sarala, Sardinia, promises to be the richest in Italy, if not in the world, showing 93.32% $BaSO_4$.

The Chemists' Corner



Are You Getting the True Lime Value on Your Raw Mix Analysis?

By Robert R. King

Chemist, Northwestern States Portland Cement Co., Mason City, Iowa

IT HAS BEEN the experience of the writer that in many laboratories the raw mix analysis reports an untrue lime value. This error is always positive, giving a higher percent. CaO than the true percentage. The analysis referred to is the complete chemical analysis in which the sample is fused with alkali carbonates (Na_2CO_3, K_2CO_3, or both). This error is not a trivial one, as in some cases it amounts to 2 or 3% calcium carbonate.

The reason for this error lies in the fact that the alkali salts from the fusion contaminate the calcium oxalate precipitate and are either weighed as CaO in the gravimetric analysis or titrated, to a certain extent, with the potassium permanganate, as sodium and potassium oxalates, in the volumetric analysis. These sodium and potassium salts cannot be washed from the precipitated calcium oxalate. Considering their high solubility, one would think that they could be washed out easily with hot water, but experience and experiment shows this not to be the case.

The following set of data brings out the above mentioned fact. The analysis was run in the usual gravimetric manner. A 0.5-gram sample was fused with different amounts of pure sodium carbonate. The results are as follows:

Grams of Na_2CO_3 used in fusion	Percent. CaO	Percent. $CaCO_3$
0.2	42.26	75.48
0.4	42.46	75.72
0.6	42.58	76.12
0.8	42.68	76.30
1.0	42.88	76.52
2.0	43.38	77.44
3.0	43.78	78.12
4.0	44.00	78.53
6.0	44.66	79.88
8.0	45.00	80.33

These data shows almost a 3% difference in the CaO value and a corresponding difference of almost 5% in the $CaCO_3$ value. Of course these data show the maximum extreme amount of fusion mixture, but they bear out the truth of the matter. Very few chemists use as little as 0.2 grams or as much as 8.0 grams, but they all are reporting an error, be it great or small.

As a raw mix sample contains only about 20% of insoluble material, which amounts to only 0.1 gram in a 0.5 gram sample, 0.2 gram of fusion mixture is plenty to complete the fusion. The writer finds that even as little as 0.1 gram will suffice.

Some Errors in Rapid Methods of Mix Control

By S. L. Meyers

Southwestern Portland Cement Co., El Paso, Tex.

IN THE JULY 5, 1930, ISSUE of Rock Products, Arthur J. Poole shows an interesting series of results which have to do with the chemical control of raw mixes. The determinations are: Ignition loss at 1000 deg. C., lime soluble in hydrochloric acid, lime soluble in hydrochloric after ignition of the raw mix, acid-alkali titration in terms of calcium carbonate, and the lime in the resulting burnt clinkers.

He arranges his series in increasing percentages of lime in burnt clinkers and shows that there is no corresponding increase in the ignition loss, the lime in raw mix or in mix calcined at 1000 deg. C., or in the titer of calcium carbonate.

To illustrate this, below are the results on samples Nos. 1, 30, and the average of the 36 samples which Mr. Poole gives:

	No. 1	No. 30	Average
Ignition loss	36.4	36.4	36.5
CaO in raw mix	41.2	41.2	41.3
CaO in calcined raw mix	63.6	63.4	63.9
$CaCO_3$ titration	76.7	76.4	76.5
CaO in burnt clinker	64.1	65.5	64.8

I purposely picked Nos. 1 and 30 because they have identical limes and losses in their raw mixes, so their calculated limes in burnt clinkers should be identical but actually are quite different.

In his discussion Mr. Poole quite rightly points out that the ignition loss at 1000 deg. C. is not the same as the volatilization losses in a kiln at a much higher temperature; in a kiln a greater amount of difficultly volatile substances, such as alkalies and sulphates, are driven off, and with his materials this may be the entire explanation, but with most raw materials and kiln conditions it is not.

Causes of Discrepancies

In general, disregarding variations in magnesium carbonate and coal ash, the two most important reasons why the acid-alkali titration, ignition loss, lime soluble in hydrochloric acid from raw, or calcined raw, are not absolute criterions of what the lime in burnt clinker will be are: Presence of acid insoluble compounds in the raw mix, and variations in the composition of the dust carried up the stacks of the kilns by the velocity of the waste-heat gases.

Calcium existing in an acid insoluble form in the raw mix affects a simple lime determination, or acid-alkali titration, by being insoluble, and as so much inert material; but at the high temperature of the kilns the lime becomes available and appears in the clinker in a soluble form. There is an absence of carbon dioxide in the acid insoluble lime compounds which affects the ignition loss. Heating the raw mix to 1000 deg. C. will unlock very few of acid insoluble compounds; to make the lime acid soluble by heat alone requires a temperature at which the higher calcium silicates are formed—

that is close to kiln clinkering temperatures.

Acid insoluble calcium compounds, in which the calcium is combined with silica, iron, alumina and other compounds, are present in almost all raw mixes from amounts which are negligible to amounts where it is imperative to make a correct determination of the total amount of lime in the raw mix. The writer once had the instructive experience of working in the laboratory of a plant where the raw mix carried sufficient garnet to cause the kiln feed acid-alkali titration to vary from 66.0 to 77.5%; still the kiln feed was correctly proportioned and the proper clinker lime obtained. Here the acid-alkali titration was retained merely as a check to insure that the mixing and blending had been properly performed before the slurry entered the kilns. Fortunately this was a wet-process plant, so an analysis represented a definite quantity which could be blended with exactness. Our method of control was to run a quicklime and ignition loss on each tank of mill ground slurry; calculate the percentage of lime in terms of burnt clinker for each tank, then proportion the tanks in terms of lime in burnt clinker instead of terms of calcium oxide or carbonate. With one exception, since material having a high ignition loss requires more pounds of raw per barrel of clinker than one with a low ignition loss, it was necessary to make a correction for this, just as it is necessary to make corrections for variation in water content of slurry regardless of what method one uses.

It is not surprising that in the figures given the lime in the calcined raw mix is lower than in the burnt clinker, since to make all of the lime soluble in all raw mixes it is necessary to resort to fusion in a platinum crucible with sodium carbonate as a flux. We found that merely sintering with one-fourth gram of sodium carbonate to a half gram of raw, as recommended by Meade, was inadequate to make all of the lime acid-soluble, where considerable lime in non-carbonate combination was present. In fact to do this with absolute surety it was necessary to flux the sample with several times its weight of sodium carbonate. After fusion the sample was dissolved with hydrochloric acid; diluted; methyl orange indicator added; ammonia added until solution turns yellow. Then oxalic acid added until solution turns a faint pink; then add the usual amount of ammonium oxalate and proceed as usual, ending with permanganate titration of the calcium oxalate. Contrary to a common assertion, calcium oxalate is appreciably soluble in an excess of oxalic acid, hence the reason for only adding it to faint pinkness with methyl orange. With a little practice one can easily make this determination in 30 minutes.

Acid-Insoluble Lime

Following is a list of a few of the common minerals which indicates how universal the presence of acid-insoluble lime is: Pyroxene group—augite, diopside, hedenbergite; amphiboles — hornblende, actinolite, tremolite; feldspars—anorthite, labradorite, andesine, oligoclase; garnets — andradite, grossularite, vesuvianite; biotite. There are also many less common minerals such as margarite, sheelite, titanite, microlite, etc., which are lime-bearing, acid-insoluble minerals. In addition there are also minerals which are only partially soluble in acids which contain lime.

Some laboratories use nitric acid in place of hydrochloric. It is only in isolated cases where this will greatly alter the results in making insoluble compounds soluble.

Another point worthy of consideration is that while the acid-soluble carbonates of finer than 100-mesh size are readily attacked by hot dilute acids, those around 30- or 40-mesh, in the case of magnesite and dolomites, require a long acid treatment. An average raw mix contains some material of this size and may introduce variable results for this reason.

In *Concrete* (Mill Section) for March, 1930, R. R. Coughlan gives an interesting modification of Newberry's method for the determination of calcium and magnesium carbonates in limestones and raw mixes. The application of this method eliminates errors due to variations in content of magnesium carbonate.

For acid-alkali titrations it is a good plan to prepare a large standard sample and have the titer men run this sample each shift. It is surprising how often a slight deviation from the regular procedure will cause large variations; also this will be found to help to keep the titrating solutions more standard.

Effect of Stack Losses

The other variable which frequently vitiates the results of the chemists on their raw materials and sets some of their best efforts to naught is one that they have little control over unless they have a Cottrell precipitator (which does not entirely eliminate it) and this is the variable composition of the dust lost up the stacks. Since the dust loss in some plants runs as high as 10%, and if this dust is richer in either lime or acid constituents than the kiln feed, it has the corresponding effect of robbing the kiln feed of one or the other constituent.

If the physical characteristics of the raw material are constant, probably no variation in the composition of the dust lost will occur; but any variation in the quantity relation of the limestone, shale, clay or slag used, or any variations in physical characteristics of each of them in themselves, such as density, particle size or texture, and the rapidity with which it breaks under calcination, or drying out, or agglomerates, as it passes down the kiln until partial vitrification actually occurs—all of these affect the ease with which the gas stream can selectively pick up and remove the dust particles.

Where a mix is made of high and low grade limestone, the high grade limestone powders readily after calcination, and much of it goes up the stack with the dust lost; in this case it is necessary to aim the calculated lime in clinker above the required lime in burnt clinker. Where clay is used for low, the opposite effect is likely to be felt, the clay being picked up by the exit gases more readily than the limestone, and it may be necessary to aim the calculated lime in clinker of the raw low to obtain the required lime in burnt clinker.

It is also possible for a slight variation to be introduced by the kiln lining selectively absorbing some constituent of the mix. In *C. A.*, 24, *1930*, 216, Alfred Muller describes a case where calcium flouride was added to the raw mix, in the kilns aluminum and iron flourides, with low boiling points, were formed; these were volatilized and replaced in the kiln lining by alkalies.

Summing up, we see there are many possible causes of a clinker consistently not having a lime which exactly follows the indications of a raw mix analysis, especially where incomplete, rapid methods alone are used for control. How closely a clinker will conform to the indications of a rapid method will depend on: The quantity of material, or condition, introducing the variable; how well the variables will balance each other (e.g., magnesium carbonate offsets insoluble non-carbonate lime in acid-alkali titrations and ignition losses); and how well the variables are appreciated by the chemist and what degree of control he has over them.

Make Study of Florescence

IN A STUDY of florescence which includes the more familiar efflorescence and cryptoflorescence, W. Angus McIntyre and R. J. Schaffer, associated with the ceramic industries of England, found that analyses of salts at and just beneath the surfaces of exposed stone and ceramic structure showed varied compositions but strikingly high SO_3 content. CaO, MgO, Na_2O or especially K_2O is the usual chief basic constituent. The soluble salt content of a ceramic unit is no definite guide to its liability to floresce. The salts causing florescence may be derived from salts originally contained in the material and from such external sources as the mortar and backing, soil, atmosphere, cleaners and preservatives. Alkali cleansers are especially provocative of florescence. Cement mortars cause more florescence than do lime mortars.

The Chemical Elements

A FOLDER "The 92 Elements," giving the name, symbol, atomic weight, melting point and year of discovery of each element, has been compiled by P. C. Kullman and Co., 110 Nassau street, New York, N. Y.

Copies of this folder, which contains much interesting information in condensed form, may be had gratis upon request to the Kullman company.

Hints and Helps for Superintendents

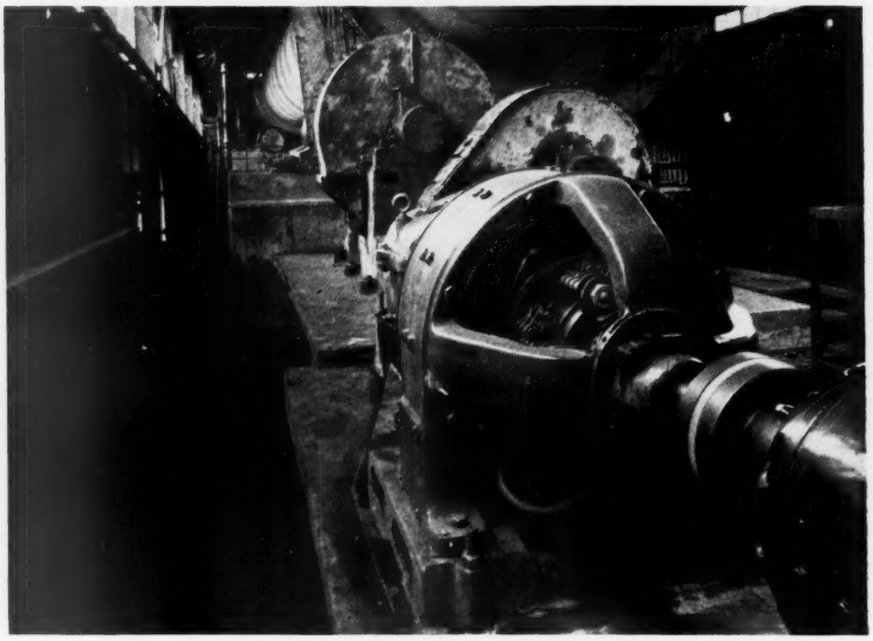
Cement Plant with Special Controls

By L. M. Stauffer
General Electric Co., Denver, Colo.

ONE of the newer portland cement plants in the Rocky Mountain states is that of the Monolith Portland Midwest Co. at Laramie, Wyo.

Considerable power is required for all the plant operations so it was necessary to provide a 24-panel switchboard for distribution. Practically all equipment is driven by either General Electric a.-c. induction or synchronous motors. Where adjustable speed drives are required, d.-c. motors are provided, the power for which is furnished by two synchronous motor-generator sets. The synchronous equipment serves to correct the power factor of the induction motor load, and consequently the combined plant load has a very good power factor.

Many special control features were provided in order to assist the operators and maintenance men. On all small induction motors a special totally-enclosed panel is provided which contains a safety switch, fuses, and magnetic contactors. Another feature of these panels is that they can be quickly disconnected and the entire panel and case removed from supporting racks. This permits quick repair or replacement of the panel. Practically all direct-current panels are built similarly.



Direct-current motor chain connected to kiln at the plant of the Monolith Portland Midwest Company

Expediting Car Loading

SAND AND GRAVEL OPERATIONS in the South are noteworthy for the great amount of stripping done when compared to the thickness of the recoverable gravel bed. This usually means pits that extend over a great area when the operation is a large one or comparatively old and the workable material becomes farther and farther from the plants. And this means that plant transportation must be speeded up, so the Roquemore Gravel Co. built a portable loading bunker at their North Montgomery (Alabama) plant to expedite the loading of the cars serving the plant.

The portable steel bunker spans the standard-gage track and rides on heavy rails for convenience in moving. The bunker is loaded by a dragline as shown.

Plant cars are loaded from this portable hopper at the plant of the Roquemore Gravel Co.

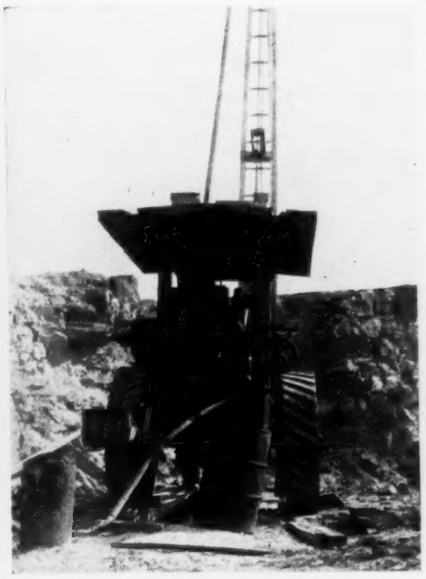
Churn Drill Sharpening

AS A RULE a contractor can take the contract for doing a given piece of work and do as good a job and at a cheaper figure than the owner can by hiring day labor or skilled labor and doing the job himself. The contractor, being a specialist, can take advantage of a lot of short cuts that

Close-up view of churn-drill in the furnace

are simple yet mean money in the operator's pocket. For instance, a Pennsylvania crushed stone producer contracts his churn drilling to a drilling company which by taking advantage of a lot of kinks can do the job cheaper than the operator. One of these kinks is the sharpening of churn-drill bits out in the quarry, right at the rig.

The device used is a 40-gal. barrel lined with fire brick, which serves as the furnace. Coal is burned, with combustion maintained by means of a 2-in. fan belted to the fly-



Air is supplied from a small fan driven from the churn drill drive mechanism

wheel of the gas engine driving the drill rig. The driller's helper starts the fire, puts the drill into the flame, and in about 30 min. the bit is ready to dress. The driller and the helper do all the dressing and tempering without stopping the drilling operations.

Concrete Elbow

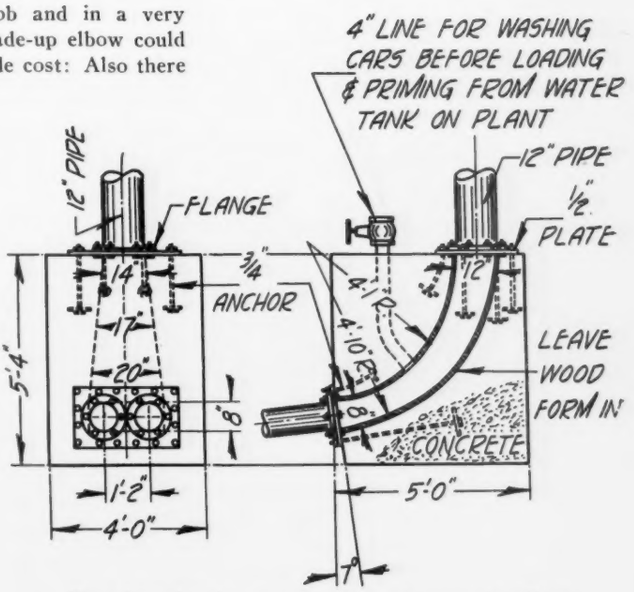
By C. O. Granger

Robbins-Young Co., New London, Minn.

AN ELBOW using concrete was recently constructed at the New London plant of the Robbins-Young Co. at New London, Minnesota.

This was a rush job and in a very tight place where a made-up elbow could not be had at reasonable cost: Also there was the friction in shorter pipes to be considered.

It will be noted that the 12-in. pipe is flanged to a plate securely anchored to the top of the elbow. Similarly, the two 8-in. inlets are bolted to a plate at the base. A second 4-in. outlet was provided at the top from which water is drawn for washing cars, or could be used for priming the pumps supplying the two 8-in. lines.



Drawing showing construction of concrete elbow

Color Comparisons

TO THE CASTING PLASTER user white material must be *white*. To compare white stuccos or lime products, put a drop of turpentine on samples set side by side and the off-colored product is easily detected. A plaster that to the naked eye is slightly gray or *almost* white becomes a dirty, almost black when treated thusly.

Chain Screen for Blast Protection

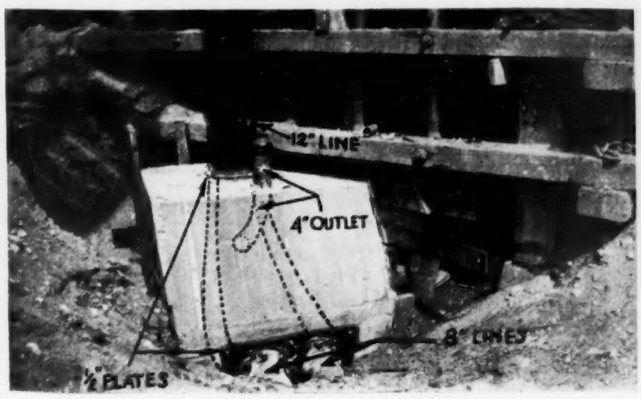
(Engineering and Mining Journal)

THE ACCOMPANYING ILLUSTRATION shows how a tunnel contractor protected air lines, etc., by a chain screen. The idea could be used "as is" or elaborated on for many quarries. The screen consists of ½-in. chain in about 6-ft. lengths. Each length is attached to a hook, which is hung over a short length of 40-lb. rail. The latter is suspended by chains from two eyebolts placed 40 ft. back from the face, as shown in the cut, and moved up every 30 ft. of advance. At first a crossbar was used for suspending the screen, but the effect of the blast was to "tie knots in the bar" and this scheme was abandoned. The eyebolt and chain-supported crossrail was then tried and proved successful.

The screen acts to slow down the rocks thrown by blasting and being free to swing escapes any great punishment. The rocks thrown are thus concentrated within a short distance of the face and all damage to air pipe, compressed air line, water pipe, and firing line is avoided.

In blasting, ordinarily rocks would be thrown to a distance of 400 ft. back from the face, but with the screen in use the rocks extend no further than 30 ft. beyond the screen. This screen not only protects the equipment but saves time in mucking out. In quartzite the best position of the screen has been found to be 40 to 70 ft. back from the face, but in softer formations it can be carried closer.

Right — Chain screen used for protecting air lines, etc.



At the left is a view of the concrete elbow

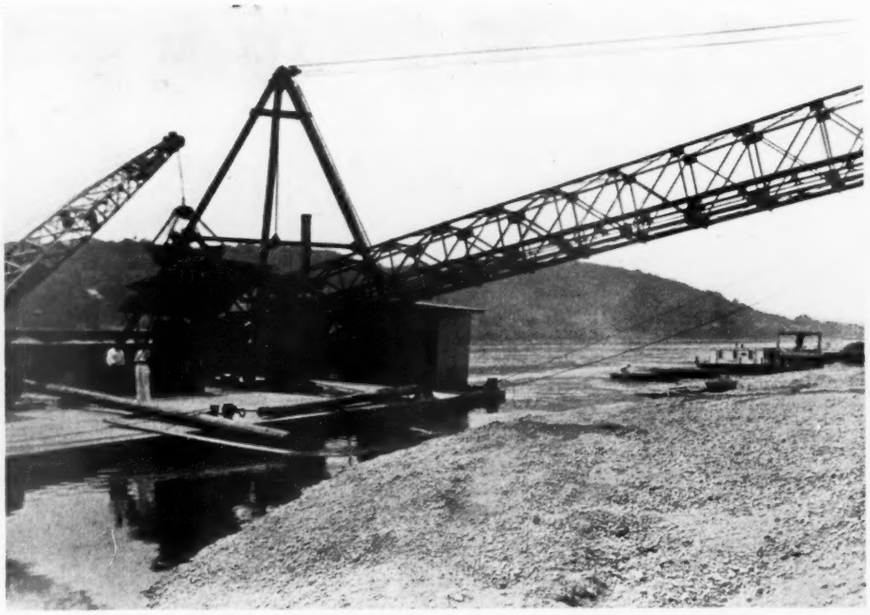
Unusual Solution of Barge-to-Shore Gravel-Handling Problem

THE BULK of the gravel used in the Louisville, Ky., district comes from the bed of the Ohio river. Extensive retail and wholesale storage yards are located on the banks of the river not only at Louisville but also at the wharves serving many smaller cities on both the Kentucky and Indiana sides of the river. The gravel and sand dug from the river bottom by several large dredges are loaded on barges which transport the material to the various docks.

Recently the operators in this field have been confronted by the problem of delivering material to quite extensive highway work which is in progress parallel to and on both sides of the river. They found that a great deal of freight and trucking could be saved if the gravel could be delivered and stored along the banks adjacent or in the immediate vicinity of the road work.

This problem was solved by E. T. Slider, of New Albany, Ind., who installed a "stacker" mounted on a 33-ft. by 100-ft. steel hull, as shown in the accompanying illustration. This stacker consists of a 30-in. belt conveyor on 150-ft. centers mounted on a structural steel boom which in turn is mounted on a turntable. The turntable permits the stacker to be swung around parallel to the boat when the equipment is towed from one unloading point to another. The boom is also pivoted so that it can be raised to maximum height when unloading at right angles to the bank, and can be lowered to rest on the hull during transportation.

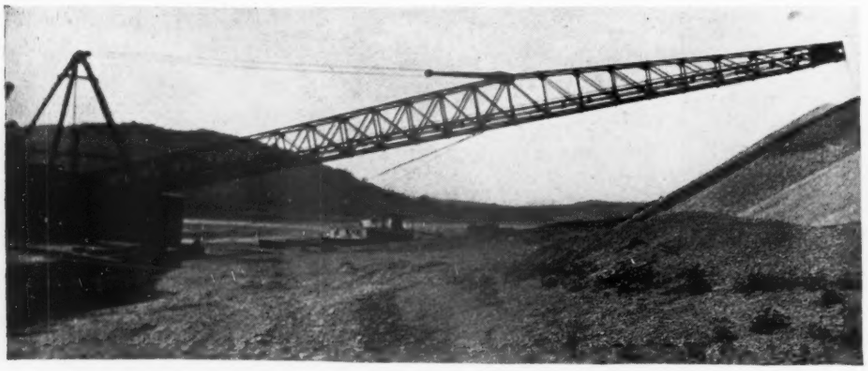
The outer end is supported by several steel cables, operating in multiple-sheave blocks. The upper end is attached to a heavy steel A-frame. A 10- by 10-ft. receiving hopper, mounted on the lower end of the boom, receives material which is unloaded by a clamshell bucket crane from a gravel or sand barge tied alongside. The clamshell crane is a Link-Belt crawler type and is mounted on the offshore side of the hull to assist in counter-balancing the cantilevered load of the boom. Compartments containing ballast also assist in keeping the hull fairly level.



Receiving hopper, mounted on lower end of boom, is served by crawler-type crane and clamshell bucket

On top of the boom directly over the pivoting point a power-driven hoist is mounted which serves to raise and lower the stacker. The conveyor is driven by a tandem drive at the foot end in order to keep as much of the weight on the offshore side of the hull as possible. A 40-hp. Continental gasoline motor drives the conveyor and hoist. The entire driving equipment is located underneath the receiving hopper, where it is well protected from any spilled material.

The machine unloads and stores material at the rate of about 200 tons per hour and, when considering its utility, the investment involved is said to be very small. The stacker was designed and furnished by the F. M. Welch Engineering Service, Inc., of Greenville, Ohio.



The structural steel boom carries a belt conveyor with 150-ft. centers

German Lime Manufacturer Visits United States

HERR MAX CONRAD, managing director of the Danube Lime Works at Saal-on-the-Danube, Germany, was a recent visitor at the office of Rock Products. Herr Conrad, who is on his way back from Japan, is visiting a number of the more important lime plants and quarries in this country to observe the manufacturing methods used.

His company, which is closely connected with the Bayerische Stickstoff-Werke, A. G. of Berlin, is a large manufacturer of lime in southern Germany.

Most of its product is burned in mixed-feed, vertical kilns using coke as fuel and is shipped as lump lime for chemical purposes, the finished product analyzing about 97% CaO.

Large kiln units are used, some of them producing in excess of 100 tons of lime each per day, as against the general practice in this country of using a large number of small units. According to Mr. Conrad such mixed-feed burning in large units with coke permits of a much more economical operation than either furnace-fired, vertical kilns or rotary kilns.

St. Louis, Mo., Gets National Crushed Stone Convention

Annual Meeting of Directors at Atlantic City Shows the National Association Is Bigger and Better Than Ever

THE DIRECTORS of the National Crushed Stone Association, at their annual summer meeting in Atlantic City, July 26, voted to hold the 1931 annual convention of the industry at the Jefferson hotel, St. Louis, Mo., January 19-22. The only other serious contender for the convention was Pittsburgh, Penn., and it was with difficulty that the directors finally came to the conclusion that St. Louis was preferable for 1931, many expressing the hope that Pittsburgh would be selected in 1932.

President W. F. Wise, Dallas, Tex., presided and the following directors were present: W. M. Andrews, Youngstown, Ohio; O. P. Chamberlain, Chicago, Ill.; F. O. Earnshaw, Youngstown, Ohio; E. E. Evans, Toledo, Ohio; Otho M. Graves, Easton, Penn.; F. T. Gucker, Norristown, Penn.; W. E. Hilliard, New Haven, Conn.; E. J. Krause, St. Louis, Mo.; A. S. Lane, Meriden, Conn.; Thomas McCroskey, Knoxville, Tenn.; Russell Rarey, Columbus, Ohio; John Rice, Easton, Penn.; James Savage, Buffalo, N. Y.; F. W. Schmidt, Jr., Morristown, N. J.; W. L. Sporborg, Syracuse, N. Y.; T. I. Weston, Columbia, S. C.; A. L. Worthen, New Haven, Conn.; H. M. Davison, Milwaukee, Wis.; E. G. Lewis, New York City; B. G. Shotton, Pittsburgh, Penn. Others present included J. R. Boyd, secretary, and A. T. Goldbeck, director of the Bureau of Engineering, of the National Association; P. B. Reinhold, Pittsburgh, Penn.; L. W. Shugg, Schenectady, N. Y.; E. T. Wolf, Philadelphia, Penn.; N. S. Greensfelder, Wilmington, Del., and Nathan C. Rockwood, Chicago, Ill.

Most of the rest of the two days of the meeting was devoted to reports of various officers of the association, particularly those relating to research work. It was the sense of all present, apparently, that very much more should be done in research than has so far been possible. On the whole the present financial condition of the association is the best it has ever been, but it was obvious more money could be and should be spent, especially in developing research.

Research Activities

A. T. Goldbeck, reporting the work of the bureau of engineering, said in part:

"During the past six months conferences have been had with state highway departments in connection with matters pertaining to state specifications. The questions involved included the following subjects:

"1. Requested changes in aggregate specifications which will permit the use of material now rejected.

"2. The question of the effect of oil-coated stone and the manner in which it could safely be used in concrete.

"3. The question of specifications for concrete involving the use of stone and slag.

"4. The question of proper specifications for stone for concrete.

"5. Slag competition.

"6. Discussing unjustly rigid requirements for stone.

"7. Conference on the building of an experimental concrete road in West Virginia containing three types of aggregates.

"8. Obtaining proper specifications for stone as compared with other aggregates for use in concrete.

"9. To point out the unfairness of certain slag specifications and the bad effects they are producing.

"10. To discuss a research project on effect of flat and elongated pieces.

"11. To confer on the rejection of dust-coated stone.

"12. To point out the serious effects of the mortar-voids specification now used in Illinois.

"In addition to the above, conferences have been had with the Bureau of Public Roads upon several matters, including the use of stone sand in concrete in federal-aid work and the desirability of the Bureau of Public Roads recognizing the beam specification in preference to other types of specification.

"The director of the Bureau of Engineering is a member of the following technical committees: Committee C-9 on Concrete and Concrete Aggregates; Committee D-4 on Road Materials; Committee E-1 on Methods of Test, and Committee C-1 on Portland Cement—all of the American Society for Testing Materials; Committee No. 201 on Concrete Aggregates of the American Concrete Institute; Committee on Nonmetallic Minerals of the American Institute of Mining and Metallurgical Engineers; Committee on Design of the Highway Research Board; Committee on Mineral Aggregates of the Highway Research Board; National County Roads Planning Commission; Association of Asphalt Paving Technologists; Committee on Subgrades of the American Road Builders Association.

"In addition to the above the director has been elected to membership on the Ballast Committee of the American Railway Engineering Association and has recently been appointed to membership on the Joint Committee on Concrete and Reinforced Concrete as a representative of the A. S. T. M. This committee is the most important committee on concrete and reinforced concrete in the United States, for its requirements are copied into a great many specifications. Its membership is made up of five representatives of each of the following organizations: American Society for Testing Materials; American Society of Civil Engineers; American Railway Engineering Association; American Concrete Institute; Portland Cement Association.

"The director also served as national councillor to represent the association at the last annual meeting of the United States Chamber of Commerce in Washington last April. He has also been designated as the official representative of the association at the Sixth International Road Congress which meets in Washington, October 6 to 11, inclusive. This congress will be attended by representatives from at least 40 countries.

Value of Research

"In still another instance the research work of the association has been the means of bringing about a field investigation which already has shown results that unquestionably will be of great benefit to crushed stone. In several cases we have been able to demonstrate the great superiority which certain crushed stones have over certain gravels, particularly in beam strength. Our one year tests on stone dust have helped to clinch the undoubted fact that dust coatings alone, provided they are not adherent dusting coatings, do no harm in concrete.

"One very important investigation which has just been completed in West Virginia was initiated by the bureau of engineering and this investigation bids fair to have a far reaching effect. The specifications of the state were so written that limestone concrete was required to have a cement factor of approximately 1.7 bbl. per cu. yd. as against 1.5 bbl. for gravel concrete. Our own laboratory tests demonstrated to us that these cement factors should be reversed and that the stone should have less cement than the gravel concrete. We persuaded the state laboratory to make tests and their test results corroborated our own. Notwithstanding this, however, the state did not change its specifications and we persuaded the high-

way department to build an experimental road six miles in length involving stone, slag and gravel. This road was divided into nine sections, three of stone, three of slag and three of gravel. In the first set of three sections all concretes had the same cement factor and the stone was overwhelmingly superior to the gravel in both compression and cross-bending, the slag occupying an intermediate position. The road experiment therefore confirmed our laboratory tests and those of the state, and it is confidently felt that the result will be that the gravel concrete will be required to have more cement than the stone concrete, just the reverse of the unfavorable conditions now existing.

"This is a striking illustration of the value of research to the stone industry, for without our own preliminary tests the old illogical West Virginia specification under which stone producers could not compete with gravel would have continued indefinitely. Now there is a strong reason for a change in specification, brought about by our own research and by research which we initiated.

"Very frequently striking demonstrations of the value of research, such as the above, are required to show that research actually pays, but it should be emphasized that there is research of a fundamental nature being carried on in our own laboratory and elsewhere, which, although impossible of evaluation because its benefits are not immediately evident, none the less is of extreme value because it is anticipating the future and is paving the way for the writing of specifications which should be of a more favorable nature than those now in existence.

"The greatest benefit to the members of the association is to be derived from that portion of the work of the bureau of engineering which is of a basic nature. Such work benefits the industry as a whole. The study of fundamental problems in the laboratory, such as the stability of bituminous mixtures, the development of a proper soundness test, the development of a method for beam testing and the design of concrete having a given beam strength, the publication of technical information, the development of a size standard, etc., are all projects having broad, general application. These, and projects of a similar nature, are the most important pieces of work of the bureau and are of the highest possible value to the industry. This is the type of work which should proceed continuously and it is to be hoped that the bureau of engineering will be able to devote a considerable amount of its time in the future to problems of this nature, in addition to the important emergency problems of individuals which unavoidably have occupied a large percentage of the time of the bureau during the past six months."

Trade Practice Rules

The necessary steps were taken by the directors to set up a committee of the National Crushed Stone Association which, with the approval of the executive committee, will endeavor to secure observance of the code of trade practice, adopted by the industry at its 1930 annual convention, and subsequently approved by the Federal Trade Commission.

Quarry Consolidation and Development Rumored at Gouverneur, N. Y.

RELIABLE information is to the effect that financial assistance has been solicited from banking houses in the state and that it is very probable that increased quarrying enterprises will be seen in Gouverneur, N. Y., by next spring. The general plan, it is said, has been submitted by local quarry owners, who are not operating at this time, to combine their industries under one head and incorporate under a new name. The marketing of limestone will be an important feature of this new development. The greater part of this limestone, according to the report, will be secured at the Porter property on the Scotch Settlement road about two miles from the outskirts of Gouverneur. The grade of stone found on the Porter property has been tested and judged to be an exceptionally fine product. A ready market has been secured, it is said, and manufacturing companies are ready to contract for the entire output of the quarry as soon as it commences operations. It is proposed to erect a crushing mill at the quarry. The property is near the New York Central lines and is well located and convenient in many ways for development, according to reports made by engineers.

Among the other quarries mentioned in the merger rumor are the John J. Sullivan quarry and possibly the Callahan property, both of which are located at the entrance of the village near the Somerville state highway. Owners of these quarries refuse to comment on the matter. It has been stated that the Floyd L. Carlisle interests have investigated the merger possibility and representatives have held conferences, the results of which have never been made public. It has been learned that an important factor in delaying the proposed merger from materializing was the excessive freight rates. The recent reduction in these rates may play a big part in bringing about the merger and starting operations, it is said.

Members of the local chamber of commerce say that they have often been consulted in the matter and have acted in several ways to bring about this development. The Solvay Process Co. of Syracuse is interested in the limestone end of the merger, it is claimed.

The Porter property was known for many years as the Corrigan-McKinley property, an organization of Cleveland interests, who owned and operated the quarry for many years and used the product in connection with their steel industry. At that time, Fred Porter, who now makes his home at the place, was in charge of the property and managed the quarry for several years.

The Sullivan quarry area comprises the old property of the Rylstone Co., which was organized in 1903 with Frank Norton as president and Fred H. Norton as vice-president. The property is located at the rear of the old Norton farm and the quarry was first developed and a mill put into operation in the fall of 1904.

The Callahan property includes a portion of the original Davidson Brothers' tract and also the old Extra Dark quarry which was established in 1903.—*Watertown* (N. Y.) *Times.*

Tennessee Quarry Company Buys Sand and Gravel Operation

A SAND DEPOSIT of 100 acres on the Watauga river near Siam in Carter county, Tennessee, belonging to John R. Dickey, of Bristol, Tenn., was leased recently to the Holston Quarry Co., of Knoxville, it was announced yesterday. The Holston Quarry Co. has had the property under option for 60 days, during which time a sand and gravel plant costing $100,000 has been erected. The plant will have a capacity of 40 cars per day, because of the improvement, whereas it formerly had a capacity of approximately 10 cars.

The lease is for 50 years, it was said, and it is believed that the tract has from 3,000,000 to 4,000,000 cu. yd. of sand and is so located that the high water will replace sand that is moved, making the supply almost inexhaustible.

It is reported that the lease will be transferred to the Watauga Stone Co., which leased Mr. Dickey's rock quarry at Watauga, Tenn. Thomas McCroskey of Knoxville is president of the Holston Quarry Co., R. S. Campbell, vice-president; W. H. McCroskey, treasurer, and Charles M. Seymour, secretary. Howard Young, who is president of the recently reorganized and recapitalized American Zinc Co., is president of Watauga Stone Co., R. S. Campbell is vice-president; W. H. McCroskey, treasurer; and C. M. Seymour, secretary.

The lease by Mr. Dickey to the quarry company, is on a royalty basis, it was said. The amount was not given.—*Bristol* (Tenn.) *Herald-Courier.*

Lime Kilns for Mexico

ARNOLD AND WEIGEL, INC., contractors and engineers, Woodville, Ohio, are furnishing two of their standard vertical lime kilns to the Compania Explotadora de Cal Pura, Mazatlan, Sinola, Mexico. These will be installed at the Marmal Station, State of Sinola, for the burning of a high-grade high calcium limestone which the company has at that point. The kilns will be wood fired. J. Meyer is manager of the company, with offices at Mazatlan on the west coast just below the Gulf of California.

Editorial Comment

Look Ahead!

Thanks to public works construction, much of it initiated for the specific purpose of filling the gap in our "continuous" prosperity program, the rock products industry is far less affected by present business conditions than most others. For the first six months of the year portland cement consumption was very nearly the same as for the like period in 1929, which, while not so good a year as 1928, wasn't really bad. Aggregate production for the first six months of this year, according to car loadings, was about 2% less than for the same period in 1929. (Aggregate production has not kept pace with cement production largely on account of the failure of the railways to carry out their ballast programs.) The two major industries most dependent on general building, rather than on public works construction, the gypsum and lime industries, are the only ones really experiencing serious falling off in demand.

We are inclined to believe that the gradual cessation in residential building which has been evident for several years may in some measure mean impending, revolutionary changes in methods of design and construction, perhaps already sensed if not understood. The steel-frame, fireproof house, in which rock products should and probably will play an important part, surely is close at hand; and when residential building again picks up there may begin an entirely new alignment of industry. As our country gets older and more settled in growth and habits, it certainly will do as other countries have always done. We shall want and build permanent homesteads, instead of wooden "balloons," which were entirely appropriate for "the first hundred years" of pioneering a new country, but which are too susceptible to fires, tornadoes, earthquakes, cold and heat to satisfy oncoming generations, who have a greater appreciation of what science and materials can do for their safety and comfort.

Rock Products on the Ground Floor

Serious damage to wooden structures by an imported termite is reported from some parts of this country. As with other imported insect pests, it is probable that the termite will increase rapidly. No one will welcome the termite, but if it helps to break us of the habit of building inflammable homes of wood it may not be an unqualified evil.

The rock products industry naturally believes that wood is an obsolete building material, and the public is coming to that belief so far as really important structures are concerned. No one today would think of putting up such great fire-trap hotels and school houses of wood as were built less than fifty years ago, or the great wooden "palaces" of forty rooms that our millionaires used to build for homes.

But most homes or dwelling houses are still built of wood, and a lot more are built of sham construction which is even worse, brick veneer or stucco on wood frames covered with chicken wire. Such construction has not even the excuse of cheapness, for all investigations made have shown that in almost all parts of the country building with concrete block is practically as cheap as *good* wood construction, the only kind that building codes and building inspection should permit. And any difference in first cost in favor of cheap wood construction is soon wiped out by the lower maintenance and heating costs and lower insurance rates on really good permanent construction.

Wood houses are expensive. The obvious feature, the high fire risk and the high insurance rate, is generally appreciated. It is enough to say of this that fire losses in cities of the United States are from four to five times as large as in some foreign cities of the same population; although, it must be admitted, that building with wood is not wholly responsible for this. An even greater menace to the public health and safety from wood structures is the harboring of vermin; rats, for example, which carry the bubonic plague, can go anywhere in wood buildings; and where cities are threatened, the first step is to make buildings rat-proof with concrete. And only the most heroic measures will drive other pests from wood walls. Living as closely as we must in towns and cities, the condition of our neighbor's house in respect to vermin and attacks from insects is almost as important as the condition of our own.

It would seem that the branches of the rock products industry which are interested could do the public a service, as well as enlarge the market for their products, by showing how adaptable these rock products are to the construction of permanent, fire-proof, vermin-proof homes. It would seem to be a good way for the associations of these branches to invest some effort and money co-operatively. Concrete block, of course, is making rapid strides in small home construction, but nothing like the number of homes are built of concrete that would be if home owners really understood its advantages.

However, concrete block has no monopoly in this field. Concrete or lime stucco on steel frame, and gypsum block and steel frame construction have been developed to where their possibilities are being understood; and gypsum "lumber," concrete "lumber" and similar products have passed the experimental stage. Sand-lime brick is thoroughly established and sand-lime products are coming on. The intending builder need not be confined to one material or any particular style of architecture. He cannot be expected to understand this, however, unless those of us who understand the advantages of our materials tell him more about them than we have hitherto. Are you preparing to get your share when the revival comes?

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	7-26-30	96	.....	
Alpha P. C. new com.[2]	7-26-30	24	25	50c qu. July 25
Alpha P. C. pfd.[2]	7-26-30	113	.....	1.75 qu. Mar. 15
American Aggregates com.[29]	7-26-30	21	23	75c qu. Mar. 1
Am. Aggre. 6's, bonds	7-30-30	87	.....	
American Brick Co., sand-lime brick	6-27-30	.....	5	25c qu. Feb. 1
American Brick Co. pfd.	7-28-30	60	65	50c qu. May 1
Am. L. & S. 1st 7's[29]	7-26-30	96½	98	
American Silica Corp. 6½'s[49]	7-29-30	No market		
Arundel Corp. new com.	7-28-30	44	.....	75c qu. July 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	7-29-30	50	60	
Beaver P. C. 1st 7's[30]	7-11-30	95	100	
Bessemer L. & C. Class A[4]	7-29-30	28	29	75c qu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	7-29-30	90	95	
Bloomington Limestone 6's[29]	6-28-30	80	84	
Boston S. & G. new com.[47]	7-26-30	16	19½	40c qu. Apr. 1
Boston S. G. new 7% pfd.[47]	7-26-30	46	50	87½c qu. Apr. 1
California Art Tile A	7-24-30	.....	97⅛	43¾c qu. Mar. 31
California Art Tile B	7-24-30	.....	3	20c qu. Mar. 31
Calaveras Cement com.	7-24-30	.....	12½	
Calaveras Cement 7% pfd.	7-24-30	.....	88	1.75 qu. July 15
Canada Cement com.	7-28-30	14¼	.....	
Canada Cement pfd.	7-28-30	94½	.....	1.62½ qu. June 30
Canada Cement 5½'s[48]	7-26-30	99¾	100½	
Canada Cr. St. Corp. bonds[48]	7-26-30	96½	.....	
Certain-teed Prod. com.	7-28-30	8½	9	
Certain-teed Prod. pfd.	7-28-30	32½	35	1.75 qu. Jan. 1
Cleveland Quarries	7-28-30	60	65	75c qu. 25c ex. June 1
Columbia S. & G. pfd.	7-29-30	89	94	
Consol. Cement 1st 6½'s, A	7-29-30	85	90	
Consol. Cement 6½% notes	7-29-30	73	78	
Consol. Cement pfd.[29]	7-26-30	50	60	
Consol. Oka S. & G. 6½'s[13] (Canada)	7-28-30	99	101	
Consol. Rock Prod. com.[44]	7-24-30	1½	2	
Consol. Rock Prod. pfd.[44]	7-24-30	12	13	43¾c qu. June 1
Consol. Rock Prod. units	7-28-30	24	26	
Consol. S. & G. pfd. (Can.)	7-28-30	.....	85	1.75 qu. May 15
Construction Mat. com.	7-30-30	16	.....	
Construction Mat. pfd.	7-28-30	40¼	41	87½c qu. Aug. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	7-25-30	92	95	
Coosa P. C. 1st 6's[29]	7-26-30	50	60	
Coplay Cem. Mfg. 1st 6's[40]	7-26-30	95	.....	
Coplay Cem. Mfg. com.[40]	7-26-30	10	.....	
Coplay Cem. Mfg. pfd.[40]	7-26-30	60	.....	
Dewey P. C. 6's (1942)	7-29-30	98	.....	
Dewey P. C. 6's (1930)	7-29-30	98	.....	
Dewey P. C. 6's (1931-41)	7-29-30	98	.....	
Dolese & Shepard	7-28-30	75	80	$2 qu. July 1
Dufferin Pav. & Cr. Stone com.	7-28-30	.....	18	
Dufferin Pav. & Cr. Stone pfd.	7-28-30	83½	85	1.75 qu. July 2
Edison P. C. com.[29]	6-28-30	10c	.....	
Edison P. C. pfd.[29]	6-28-30	25c	.....	
Giant P. C. com.[2]	7-26-30	5	15	
Giant P. C. pfd.[2]	7-26-30	15	25	1.75 s.-a. June 16
Gyp. Lime & Alabastine, Ltd.	7-28-30	19½	19¾	37½c qu. July 2
Hermitage Cement com.[11]	7-26-30	30	40	
Hermitage Cement pfd.[11]	7-26-30	86	95	
Ideal Cement, new com.[33]	7-26-30	50	52	75c qu. July 1
Ideal Cement 5's, 1943[33]	7-26-30	96	98	
Indiana Limestone units[29]	7-26-30	.....	85	
Indiana Limestone 6's	7-28-30	77	.....	
International Cem. com.	7-28-30	69	69½	$1 qu. June 27
International Cem. bonds 5's	7-28-30	100¾	101¼	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	7-25-30	.....	91	
Kelley Is. L. & T. new st'k	7-28-30	36¼	41	62½c qu. July 1
Ky. Cons. St. com. V. T. C.[43]	7-24-30	9	10	
Ky. Cons. Stone 6½'s[48]	7-24-30	94	98	
Ky. Cons. Stone pfd.[48]	7-24-30	88	92	1.75 qu. Aug. 1
Ky. Cons. Stone com.[48]	7 24-30	9	10	
Ky. Rock Asphalt com.[31]	7-26-30	11	14	40c qu. July 1
Ky. Rock Asphalt pfd.[31]	7-26-30	85	90	1.75 qu. Mar. 1
Ky. Rock Asphalt 6½'s[31]	7-26-30	95	100	
Lawrence P. C.	7-25-30	57	63	$1 qu. June 28
Lawrence P. C. 5½'s, 1942	7- 9-30	84½	88½	
Lehigh P. C.	7-28-30	33	35	62½c qu. Aug. 1
Lehigh P. C. pfd.	7-28-30	105	107¼	1¾% qu. July 1
Louisville Cement[7]	7-24-30	230	.....	
Lyman-Richey 1st 6's, 1932[13]	7-28-30	97	99	
Lyman-Richey 1st 6's, 1935[13]	7-28-30	97	99	
Marblehead Lime 6's[14]	7-25-30	90	95	
Marbelite Corp. com. (cement products)	7-26-30	200	.....	
Marbelite Corp. pfd.	7-26-30	12	.....	50c qu. July 10
Material Service Corp.	7-30-30	20	.....	50c qu. June 1
McCrady-Rogers 7% pfd.[32]	7-26-30	49	.....	
McCrady-Rogers com.[22]	7-26-30	20	20½	
Medusa Portland Cement	7-28-30	.....	97½	1.50 July 1
Mich. L. & C. com.[6]	7-26-30	20	25	
Missouri P. C.	7-28-30	29½	30	50c qu. Aug. 1
Monolith Portland Midwest[9]	7-24-30	2	3	
Monolith bonds, 6's[9]	7-24-30	80	85	
Monolith P. C. com.[9]	7-24-30	4	5	40c s. -a. Jan. 1
Monolith P. C. pfd.[9]	7-24-30	4	5	40c s. -a. Jan. 1
Monolith P. C. units[9]	7-24-30	12½	15	
National Cem. (Can.) 1st 7's[43]	7-26-30	99½	100½	
National Gypsum A com.	7-28-30	5¾	6½	
National Gypsum pfd.	7-28-30	27	31	
Nazareth Cement com.[26]	7-14-30	22	.....	
Nazareth Cement pfd.[26]	7-14-30	100	.....	
Newaygo P. C. 1st 6½'s[29]	7-26-30	100½	.....	
New Eng. Lime 1st 6's[14]	7-25-30	80	85	
N. Y. Trap Rock 1st 6's	7-28-30	100¾	.....	
N. Y. Trap Rock 7% pfd.[36]	7-14-30	95	.....	1.75 qu. Apr. 1
North Amer. Cem. 1st 6½'s	7-25-30	60	.....	
North Amer. Cem. com.[29]	7-26-30	4	7	
North Amer. Cem. 7% pfd.[29]	7-26-30	20	24	
North Shore Mat. 1st 5's[15]	7-29-30	95	.....	
Northwestern States P. C.[37]	7-26-30	110	120	$2 Apr. 1
Ohio River Sand com.	7-28-30	15	17	
Ohio River Sand 7% pfd.	7-28-30	97	99	
Ohio River S. & G. 6's[16]	7-26-30	85	90	
Oregon P. C. com.[9]	7-24-30	.....	14	
Oregon P. C. pfd.[9]	7-24-30	.....	97½	
Pacific Coast Aggregates pfd.	7-28-30	5	10	
Pacific Coast Cement 6's[5]	7-24-30	75	77	
Pacific P. C. com.	7-24-30	14	25	
Pacific P. C., new pfd.	7-24-30	.....	75	1.62½ qu. July 5
Pacific P. C. 6's[5]	7-24-30	99½	.....	
Peerless Cement com.[21]	7-28-30	7	9	
Peerless Cement pfd.[21]	7-28-30	80	85	1.75 Apr. 1
Penn.-Dixie Cement pfd.	7-28-30	40	48	
Penn.-Dixie Cement com.	7-28-30	7½	8	
Penn.-Dixie Cement 6's	7-28-30	78⅛	78¼	
Penn. Glass Sand Corp. 6's	7- 9-30	102	104	
Penn. Glass Sand pfd.	7- 9-30	110	.....	1.75 qu. July 1
Petoskey P. C.	7-28-30	9	10	15c qu. Apr. 1
Port Stockton Cem. units[9]	2-17-30	.....	30	
Port Stockton Cem. com.[9]	7-24-30	No market		
Riverside Cement com.	7-24-30	.....	14	
Riverside Cement pfd.[9]	7-24-30	.....	85	1.50 qu. Aug. 1
Riverside Cement, A	7-15-30	12	14	31¼c qu. Aug. 1
Riverside Cement, B[44]	7-24-30	2	.....	
Roquemore Gravel 6½'s[17]	7-26-30	99	100	
Santa Cruz P. C. 1st 6's, 1945[5]	7-24-30	105½	.....	6% annually
Santa Cruz P. C. com.	7-24-30	90	.....	$1 qu. July 1
Schumacher Wallboard com.	7-24-30	10	11	
Schumacher Wallboard pfd.	7-24-30	21½	25	50c qu. May 15
Southwestern P. C. units[44]	7-24-30	240	.....	
Standard Paving & Mat. (Can.) com.	7-28-30	17	18	50c qu. Aug. 15
Standard Paving & Mat. pfd.	7-28-30	87	88	1.75 qu. Aug. 15
Superior P. C., A	7-24-30	.....	37	27½c mo. Aug. 1
Superior P. C., B	7-24-30	10¾	12	25c qu. Mar. 20
Trinity P. C. units[37]	7-26-30	130	140	
Trinity P. C. com.[37]	7-26-30	30	40	
Trinity P. C. pfd.[29]	7-26-30	110	120	
U. S. Gypsum com.	7-28-30	42½	43	40c qu. June 30
U. S. Gypsum pfd.	7-26-30	112	116	1.75 qu. June 30
Universal G. & L. com.[3]	7-29-30	No market		
Universal G. & L. pfd.[3]	7-29-30	No market		
Universal G. & L., V. T. C.[3]	7-29-30	No market		
Universal G. & L. 1st 6's[3]	7-29-30	No market		
Warner Co. com.[16]	7-26-30	39¼	40	50c qu. & 25c ex. July 15
Warner Co. 1st 7% pfd.[16]	7-26-30	97	100	1.75 qu. July 1
Warner Co. 1st 6's	7-29-30	98	99	
Whitehall Cem. Mfg. com.[38]	7-14-30	80	.....	
Whitehall Cem. Mfg. pfd.[38]	7-14-30	50	.....	
Wisconsin L. & C. 1st 6's[15]	7-29-30	95	.....	
Wolverine P. C. com.	7-29-30	4½	4¾	15c qu. Aug. 15
Yosemite P. C., A com.[9]	7-24-30	2¼	2¾	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Beadling & Co., Youngstown, Ohio. [5]Smith, Camp & Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simon & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Atlantic Gypsum Products Co. 6's, 1941, $4,000 and 40 shs. com.[1]	35%	.....
Holliston Trap Rock Co. com.,[3] 67 sh., per sh.	35	.....
Consolidated Cem. com. v.t.c., 3220 shs.[1]	1½ per share	.....
Indiana Limestone deb. 7's, 1936, with warrants ($1,000)[4]	$500 for the lot	.....

[1]Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. [3]Price at auction by R. L. Day & Co., Boston, July 16, 1930. [4]Price at auction by Adrian H. Muller & Son, Dec. 26, 1929.

Warner Co.'s Six Months' Earnings

THE WARNER CO., Philadelphia, Penn., reports earnings for the first six months of 1930 as follows:

Net after preferred dividends $343,154
Earned per share, common $1.47
Number of common shares, 234,048.

ASSETS

Consolidated balance Sheet, as of:	June 30 1930	Dec. 31 1929
*Property account	$16,470,992	$16,884,519
Inventory—construction and other costs	629,945	562,166
Current assets:		
Cash	421,340	623,106
Secured loans, etc.	.....	470,362
Notes and accounts receivable (net)	1,587,727	1,171,191
Inventories	912,126	860,276
Insurance, compensation and sinking funds	169,485	157,589
Deferred charges	1,313,931	810,926
Total	$21,505,546	$21,540,135

LIABILITIES

†1st preferred stock	$2,855,700	$3,112,300
†2nd preferred stock	5,550,000	5,750,000
†Common stock	3,206,961	2,074,771
Bonded debt	6,252,000	6,684,000
Mortgage	45,000	45,000
Ground rents	365,000	365,000
Leaseholds and purchased contracts	519,000	580,000
Purchase obligations	871,320	1,030,320
Current liabilities:		
Accounts payable	226,107	159,860
Dividends payable	322,835	347,534
Accrued federal tax	68,130	134,722
Accrued bonus tax	30,000	30,000
Accrued interest and ground rents	104,288	115,462
Other accruals	55,478	45,014
Reserve for insurance, compensation and repairs	145,457	209,265
Acquired surplus	475,134	495,973
Earned surplus	413,136	360,914
Total	$21,505,546	$21,540,135
Current assets	$2,921,193	$3,124,935
Current liabilities	806,838	832,592
Working capital	$2,114,355	$2,292,343

*Less reserves: 1930, depletion, $730,169, depreciation, $5,912,022; 1929, depletion, $678,660, depreciation, $5,494,451. †Represented by: 1930, 28,557 first preferred, 55,500 second preferred and 234,048 common no par shares; 1929, 31,123 first preferred, 57,500 second preferred and 204,727 common no par shares.

Weston and Brooker Co. to Offer Bond Issue

THE South Carolina National Bank, Columbia, S. C., recently offered $380,000 first mortgage 6½% serial sinking fund gold bonds at prices to yield from 6% to 6½%, according to maturity, of the Weston and Brooker Co., crushed-stone producer, Columbia, S. C.

The bonds are dated June 1, 1930; due serially June 1, 1931-1937 in denominations $1000 and $500. Principal and interest (June and December) payable at the offices of the South Carolina National Bank, Charleston, Columbia, Greenville, S. C., and (or) the Guaranty Trust Co. of New York. The bonds are callable for sinking fund purposes in the inverse order of their maturity at 102½ and interest; callable as a whole on 30 days' notice, at 105 and interest, up to and including July 1, 1932, and thereafter at a decrease in the premium of ½ of 1% for each six months. The South Carolina Security Co., Charleston, S. C., is trustee.

The company owns and operates one of the largest and most modern rock crushing plants and granite quarries in the southeast. It also owns and operates a similar plant located at Parkhill, S. C. The company has acquired a plant site near Camak, Ga., on which is to be constructed a crushing plant and quarry at an estimated cost of $386,419.

The average annual earnings for the three years ending December 31, 1929, applicable to the fixed charges on this issue, were $91,906 before depreciation and $58,777 after depreciation. These amounts include sinking fund payments on the outstanding issue which will be retired out of the proceeds of this issue. Earnings for 1929 were $125,073 and $80,895, respectively. The above earnings do not include profits of the Parkhill plant for the years 1927 and 1928, both of which years were profitable ones, but for which figures were not available. These figures do not include any anticipated earnings on the Georgia property.

In addition to the monthly sinking fund requirements to care for the annual interest and maturity requirements, the company is to deposit with the trustee 40% of annual net earnings for retirement of additional bonds.

The proceeds will be used to retire present outstanding bonds and for construction of the plant at Camak, Ga., work on which has already started.

National Gypsum Co.'s First-Half Earnings

THE NATIONAL GYPSUM CO.'S operations for the first half of the year showed a net profit of $108,312.19 compared with a deficit of $78,850.71 for the first six months of last year. This represents an increase of $187,163 over last year, according to a statement recently issued.

These earnings for the first half of the year represent $4.12 per share on the company's preferred stock after allowance for bond interest, depreciation, depletion and other reserves. Net sales showed an increase of 16.4% in value over last year.

Regardless of the slowing up in building and general business, 396 new dealers were secured, the volume from which partly offset shrinkage in sale to the older accounts. Satisfactory progress has been made in the sale of insulation board to present dealers, with indications of this product growing to an attractive volume as the year advances.

Production facilities have been rounded out with improvements resulting in a new high standard of efficiency and quality of output at each mill. Average unit manufacturing costs for the first six months on major products were the lowest that they have ever been.

As of June 30, 1930, the company's balance sheet shows current assets of $1,315,203.49 and current liabilities of $170,956.10. This discloses a ratio of current assets to current liabilities of about 8 to 1. In addition to a substantial amount of cash invested in plant improvements, the company acquired $24,000 principal amount of bonds to be used against sinking fund requirements the next two years.

General business conditions have led the company directors to feel that payment of preferred dividends should be deferred until there is more evidence of a general improvement in business.

Alpha Cement Statement for 12 Months Ended June 30

THE ALPHA PORTLAND CEMENT CO. reports for 12 months ended June 30, 1930, net income of $1,408,916 after depreciation and federal taxes, equivalent, after 7% preferred dividend requirements, to $1.78 a share on 711,000 no-par shares of common stock. This compares with $2,375,368 or $3.14 a share in the 12 months ended June 30, 1929.

Consolidated income account for 12 months ended June 30, 1930, compares as follows:

	1930	1929
Net sales	$10,797,831	$13,424,100
Operating expenses	8,150,627	9,741,568
Depreciation	1,317,547	1,254,313
Operating profit	$1,329,657	$2,428,219
Other income	248,985	274,169
Total income	$1,578,642	$2,702,388
Federal taxes	169,726	327,020
Net income	$1,408,916	$2,375,368
Preferred dividends	*175,000	140,000
Common dividends	1,955,250	2,133,000
Surplus	$721,334	$102,368

*Includes five quarterly dividends.

Consolidated balance sheet of Alpha Portland Cement Co. as of June 30, 1930, compares as follows:

ASSETS

	1930	1929
*Property account	$21,733,564	$22,480,305
Cash	1,924,593	2,301,486
Call loans	.....	2,000,000
U. S. Governm't securities	3,864,975	1,357,975
Work funds and advances	200,467	158,860
Accounts and notes receivable	957,115	1,190,608
Inventories	2,804,679	2,799,995
Miscellaneous investments	272,829	220,967
Deferred charges	146,027	528,136
Total	$31,904,249	$33,038,332

LIABILITIES

Preferred stock	$2,000,000	$2,000,000
†Common stock	24,134,500	24,134,500
Accounts payable	436,049	532,884
Wages payable	74,759	97,677
Federal tax reserve, etc.	211,236	319,523
Dividends payable	390,500	533,250
Insurance and other reserves	733,248	775,207
Earned surplus	3,923,957	4,645,291
Total	$31,904,249	$33,038,332

*After depreciation, depletion, etc. †Represented by 711,000 no-par shares.

Recent Dividends Announced

Bessemer Limestone & Cement Cl. A (qu.)	$ .75,	Aug. 1
Consumers Co. pr. pfd. (qu.)	1.50,	Oct. 1
Standard Paving & Mat. Ltd. com. (qu.)	.50,	Aug. 15
Standard Paving & Mat. Ltd. pfd. (qu.)	1.75,	Aug. 15
Wolverine Portland Cement (qu.)	.15,	Aug. 15

Capital Structure of New Blue Diamond Corp.

AS NOTED in Rock Products, July 19, p. 54, the entire assets of the W. C. Hay Corp., the Blue Diamond Co., the Blue Diamond Cement Co., and the Blue Diamond Co. of Nevada, were recently acquired by the newly formed Blue Diamond Corp., Ltd., Los Angeles, Calif.

The capital of the new corporation, according to the permit, consists of 120,000 convertible preferred shares and 480,000 common shares of no par value. The corporation was permitted to issue 50,015 shares of preferred and 300,030 shares of common.

Permanent officers have not yet been selected, it was announced. W. C. Hay, who has heretofore had the general management of the various properties taken over by the new corporation, is retiring from active management, but otherwise the personnel of the units will remain the same, it is understood. Mr. Hay retains his membership on the board of directors.

The Blue Diamond Co. was incorporated in December, 1923, as the successor to the Blue Diamond Materials Co., incorporated in 1918. The company manufactures and distributes a wide range of basic fireproof building materials and wholesales and retails lathing material, cement, etc. It owns 23½ acres at Sixteenth and Alameda streets, Los Angeles, on which are located a plaster mill for the manufacture of hardwall plaster and other plaster products; plants for the manufacture of gypsum block, mixed mortar and cement; a reinforcing steel fabricating plant, a warehouse and other facilities for carrying on a general building material distribution business. The company controls the Blue Diamond Co. of Nevada.

In Nevada is located a large deposit of high-grade gypsum, connected with the main line of the Union Pacific by a corporation - owned 25-mile railroad. Other assets comprise a lime property and gypsum deposit in the Imperial Valley, and sand, rock and gravel deposits in both the San Gabriel and San Fernando valleys, together with the necessary manufacturing plants, bunkers and equipment.

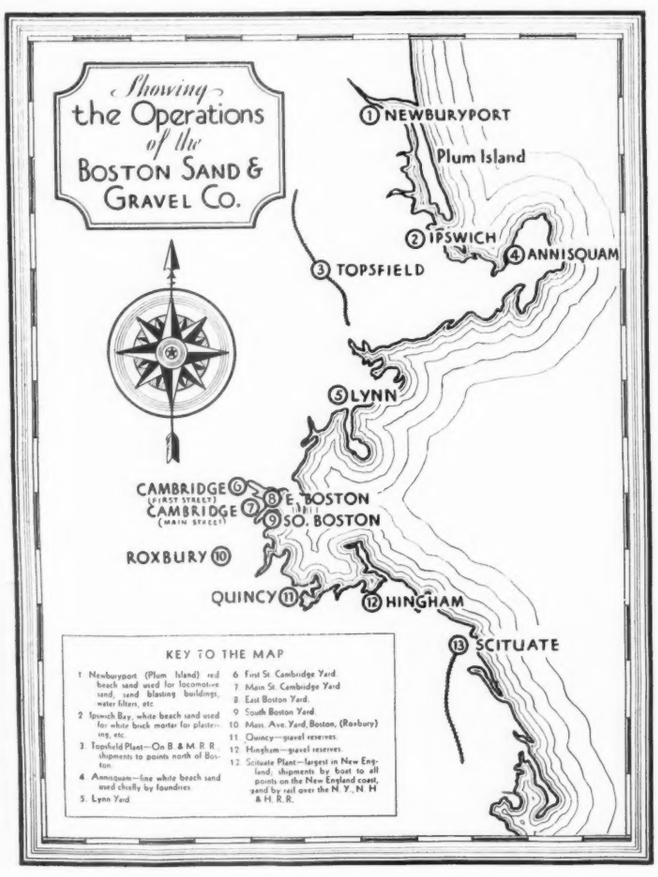
Sales of the Blue Diamond Company in 1929 totaled $4,413,693. Net profits were given at $277,180, or $13.52 a share on 20,500 shares of capital stock. Total assets as of December 31, last, were listed at $4,906,954. Currents assets were $1,069,752 and current liabilities $315,964, leaving working capital of $753,788. Bonded debt of the company at the end of 1929 stood at $910,000. The authorized capital stock amounted to $5,000,000 of $100 par shares, of which $2,050,000 was outstanding, all owned by W. C. Hay, president of the company.

Gypsum Sales in Canada Above 1929

SALES of Gypsum, Lime and Alabastine, Canada, Ltd., for the month of June this year are understood to show some decrease as against those for the same month last year, but sales for the six months ended June 30 this year are understood to show an increase over 6% over those for 1929.

Sand and Gravel Advertising

THE ACCOMPANYING MAP, showing the operations of the Boston Sand and Gravel Co., is a part of an attractive circular describing briefly and illustrating generously the various plants of this company. The original circular is 8½x11 in. in a thrice-folded sheet. More such advertising by the industry would help materially to give it prestige.


Showing the Operations of the BOSTON SAND & GRAVEL CO.
1 NEWBURYPORT
Plum Island
2 IPSWICH
4 ANNISQUAM
3 TOPSFIELD
5 LYNN
CAMBRIDGE (FIRST STREET)
CAMBRIDGE (MAIN STREET)
8 E. BOSTON
9 SO. BOSTON
ROXBURY 10
QUINCY 11
12 HINGHAM
13 SCITUATE
KEY TO THE MAP
1. Newburyport (Plum Island) red beach sand used for locomotive sand, sand blasting buildings, water filters, etc.
2. Ipswich Bay, white beach sand used for white brick mortar for plastering, etc.
3. Topsfield Plant—On B. & M. R. R. shipments to points north of Boston.
4. Annisquam—fine white beach sand used chiefly by foundries.
5. Lynn Yard.
6. First St. Cambridge Yard.
7. Main St. Cambridge Yard.
8. East Boston Yard.
9. South Boston Yard.
10. Mass. Ave. Yard, Boston, (Roxbury)
11. Quincy—gravel reserves.
12. Hingham—gravel reserves.
13. Scituate Plant—largest in New England, shipments by boat to all points on the New England coast, sand by rail over the N. Y., N. H. & H. R. R.

United States Gypsum Co. Earnings for First Half

THAT the United States Gypsum Co., Chicago, Ill., will be able to show for the first half of 1930 an increase in net of approximately one-third more than the $2,329,000 reported for the first six months of 1929, when building was much more normal, is the view expressed in a special analysis of the corporation prepared by Lamborn, Hutchings and Co.

"The building industry has been particularly hard hit by the current business depression and the United States Gypsum Co. as a producer and distributor of building materials has been affected by a sharp decrease in sales volume," the review states.

"However, for the first six months of 1930 it is unofficially estimated that net earnings will run approximately one-third ahead of the $2,329,000 reported by the company for the first half of 1929 when building was much more normal. Thus, net the first half of the current year is expected to be somewhere in the neighborhood of $2.70 a share on 1,149,290 shares of common outstanding.

"United States Gypsum Co., originally incorporated in 1901, today occupies a position of the foremost importance in the field of building materials. It has become the leading producer and distributor of gypsum products and holds a dominant position in the entire gypsum industry. The company manufactures in excess of 200 leading products, including all sorts of plaster, plaster board, stucco material, sheathing, tiling, insulating material and related lines, including lime, stucco paints, metal lath and tile.

"In recent years a severe price war sharply reduced earnings. United States Gypsum Co., however, because of its very much lower costs, not only was enabled to show satisfactory profits all during the price-war period extending over some four years, but, when the difficulty was settled last year, emerged in stronger trade position than ever.

"There is reason to believe that the expansion program, which included erection of four plants at Chicago, Detroit, Boston and Philadelphia, is about ended, so that from now on the company will be devoting its efforts to lowering costs and stimulating demand for its line of products. This in time should put the stock in a better position for participating in larger profits. The company has already indicated its intention of adopting a more liberal dividend policy once the expansion program is completed," the analysis states.

Monolith Passes Dividends

THE DIRECTORS of the Monolith Portland Cement Co., Los Angeles, Calif., have voted to omit the semi-annual dividend of 40 cents per share on the common stock and to defer the regular semi-annual dividend of 40 cents per share on the preferred stock.

Materialmen Allowed Recovery on Bond of Highway Contractor

Liability of Surety Held Not to Be Limited to Claims by County in View of Validity of Clause in Contract in Favor of Third Parties

IN THE CASES of the Portland Sand and Gravel Co., Portland, Penn., et al., versus the Globe Indemnity Co., appealed from judgments of the Court of Common Pleas of Northampton County, the Supreme Court of Pennsylvania delivered an opinion June 21, 1930, affirming the lower court. The facts found and the court's opinion are of general interest to all construction material producers and are given in brief below.

It was brought out that the Globe Indemnity Co. was surety on a bond given by the Juniata Co. as principal in connection with the construction of certain highways in Northampton county. The contract provided for the giving of security, to insure a proper compliance with its terms, equal to 50% of the total consideration payable. The obligation, signed by the contractor as principal, and the Globe Indemnity Co. as surety, set forth that they "are held and firmly bound unto the Commonwealth of Pennsylvania for the use of the County of Northampton and any other corporation or person interested," and was conditioned to "save harmless the County of Northampton from any expense incurred through the failure of the said contractor to complete the work as specified or for any damages growing out of the carelessness of said contractor. or his, their or its servants; and [to] well and truly pay for all material furnished or labor performed in and about the construction of said highway."

There was added the further provision, important to the determination of this case, which reads as follows:

> The principal and surety further jointly and severally agree with the obligee herein that in case of failure on the part of either to carry out the terms and provisions of this contract and bond, that any person, firm or corporation who has furnished labor and materials, used in and about the construction of said highway, and payment for which has not been made, shall have the right to intervene and be made a party in the action instituted by the county, the obligee on this bond, and to have their rights and claims adjudicated in such action and judgment rendered thereon, subject, however, to the priority of the claim and judgment of the said county, and further agree that if no suit should be brought by the county within six months after the completion of said contract and final settlement thereon, then the person or persons supplying the contractor with labor and materials shall have the right to institute suit hereon, and that the procedure to collect on this bond shall follow the provisions of the act of May 31, 1911, P. L. 468, and its supplements and amendments thereto, except that where the words "Commonwealth of Pennsylvania" appear in said acts the county, which is the obligee herein, shall be substituted.

All of the plaintiffs furnished material to the Juniata Co., the principal, with knowledge of the terms of the bond referred to, but the sums which became due were not paid, though demand for the satisfaction of their claims was made. It was set forth in the case stated that the only defense is that averred in paragraph 7, the parties stipulating that no question should be raised or considered as to compliance with the procedure prescribed in the bond. The section referred to reads as follows:

> That the said Globe Indemnity Co. has wholly refused payment, alleging that the said bond was not given in accordance with the requirement of any statute or ordinance, and that no materialman may sue on such bond in accordance with the provisions of any existing statute or ordinance, and that in the requiring of said bond the County of Northampton was not acting in pursuance of any statute or ordinance and no right of action was thereby secured to any materialman.

Defense Claim

The defenses set up are limited to the claim that the plaintiffs are mere third party beneficiaries, making impossible a recovery by them, and that the County of Northampton acted beyond the scope of its powers in accepting a bond for other than the faithful performance of the contract to build according to specifications. It is therefore insisted that the clause included, protecting those furnishing labor and material, is unenforceable.

It was held by the defendants that in previous opinions cited unpaid creditors not a party to the contract could not recover and that such an instrument as here involved was made solely for the benefit of the county and that the materialmen as third parties had no right to action thereunder.

Court's Opinion in Brief

The court held that similar cases where cities required a separate bond to protect materialmen, and which had been determined not contrary to public policy, would justify a similar course by a county where the legislature had not prescribed otherwise; and that the county may protect those furnishing labor and material either by requiring a separate bond or by making them parties to its own bond, as was done in this case.

"The act of May 31, 1911, regulating the building of county roads, does not limit the right of recovery and does not prevent inserting such a clause as was included in this case, nor recovery under it. The bond was given for the use of the county, and any others interested, to protect them for labor and material furnished by third parties, and to permit actions to collect.

Sold on Assumption of Protection

"The materialmen furnished supplies on the basis of the bond expressly providing for their protection as well as that of the county.

"The bond was given voluntarily for a lawful purpose and may be enforced according to its terms. In the present case the surety company obligated itself to make payment to the materialmen who were made parties to the contract, and expressly given the right to sue, and the materialmen, on the strength of the protection offered, furnished the supplies, the value of which is sought to be recovered. The defendant surety company cannot complain when held to a responsibility voluntarily assumed."

Michigan State Gets the Profit from Great Lakes Sand and Gravel

SINCE the Michigan State Department of Conservation in 1917 organized a system of royalties for sand and gravel taken from the Great Lakes abutting the state, or their bays and harbors, the state of Michigan has derived an aggregate income of $223,248.79 from this source by the end of the year 1929, a report by the Lands Division of the Department shows.

The Conservation Commission has now increased the royalty rate by 100%.

A royalty of 10c. a cubic yard for sand and 16c. a cubic yard for gravel is now charged by the state as compared with 5c. for sand and 8c. for gravel charged until the later rates were voted.

Since the sand and gravel royalty system went into effect in 1917, 110 leases have been issued by the state. Eleven such leases are now in effect.

While it is necessary to obtain a lease from the Department of Conservation to obtain sand or gravel from the waters of the Great Lakes adjoining the state, most of the leases obtained in the past 13 years have been in St. Clair Flats.—*Howell* (Mich.) *Press.*

Foreign Abstracts and Patent Review

An Example of Limestone Quarry Analysis. An example of the thoroughness with which a Geman lime operation tackled the problem of finding what its quarry contained, how much, and how to get at it is given in what follows: The quarry considered in this study contains large layers of good or Ia limestone quality with a high $CaCO_3$ content. Fr. Muench desired to determine the proportion of this material to the other rock materials available in the various working stopes. The plant supplied from this quarry requires besides the marls about 450,000 kg. of raw materials, of which 360,000 kg. is to be Ia limestone and 90,000 kg. crushed stone or waste rock. The specific problem was to determine whether the quarry was capable or could be rendered capable of supplying daily this quantity of raw material.

Table 1 represents a profile or cross-section of the prospected quarry, which indicates the working areas and those rocks which can be considered for quarrying. As indicated by the drawing of the deposits and the working stopes which have been started, the quarry is still in the stage of exploration. It was therefore necessary that in working the deposits a turn be made in a southwest direction, by using the first fault as a pivot; this was necessary in order to reach the given direction of run, where the condition of working in respect to the winning of Ia limestone is no longer interfered with by newly uncovered inferior deposits of rock, to the same extent as in the exploration work. Another and a still more compelling reason for working in the direction was the fact that the section worked farthest to the west back of the second fault is very close to the outcropping of the highest grades of rock deposits, such as shell lime, mosaic, etc.

TABLE 1. PROFILE OF THE QUARRY OF A LIME PLANT

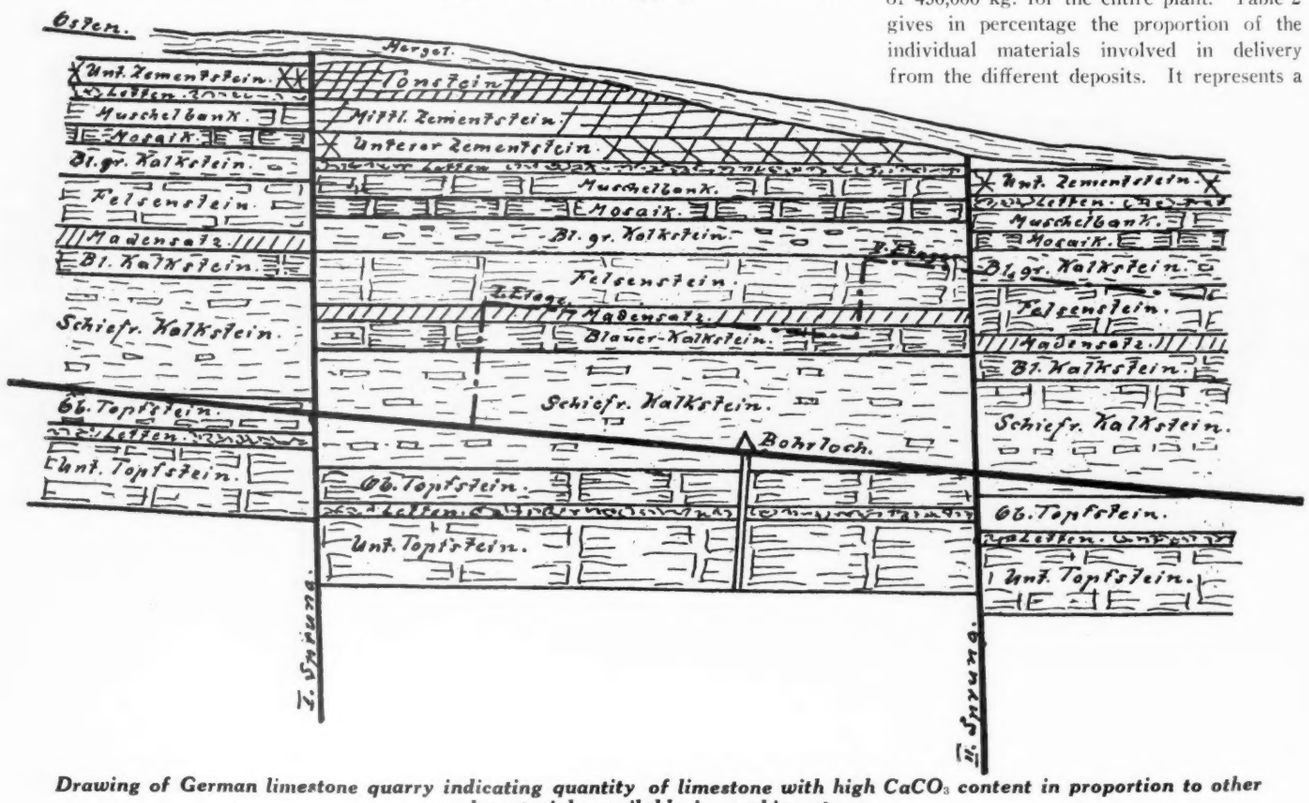
(See Table 2 for depth of each deposit)

Mergel—Marl.
Tonstein—Clay stone.
Mittl. zementstein—Middle cement rock.
Unterer zementstein—Lower cement rock.
Letten—Potter's clay.
Muschelbank—Shell deposit.
Mosaik—Mosaic.
Bl. gr. kalkstein—Blue-gray limestone.
Felsenstein—Rocky stone.
Madensatz (terebratelbank)—Terebra deposit.
Blauer kalkstein—Blue limestone.
Schiefr. kalkstein—Slate limestone.
Ob. topfstein—Upper potstone.
Letten—Potter's clay.
Unt. topfstein—Lower potstone.

Osten—East.
Westen—West.
I Sprung—I fault.
II Sprung—II fault.
I Etage—I stage.
II Etage—II stage.
Bohrloch—Drilled hole.
Scale for heights, 1:500.
Scale for lengths, 1:150.

The raw limestone is worked at the bottom of the quarry, 23 m. below the topsoil, and in a first and second stage. The working face measures 6.5 m. from the quarry bottom to the first stage, 13 m. in the first stage and 8 m. in the second stage. The cement rock and limestone require separate handling. The working and delivery of the "clay" stone, cement rock, potters' clay, and marl must precede that of the limestone. The deposits are disturbed by two faults of 7 m. and 1.5 m. height, but there are no further variations in the deposits worth noting. The angle of inclination of the deposits is 12 deg. The deposits are listed in series in Table 2, and also the thickness of each.

Of the 450,000 kg. of limestone required daily by the plant, 210,000 kg. is for the ring kiln. The two shaft kilns require daily 150,000 kg. of limestone; but since there is a shortage in this material, cement rock and rock waste are burned besides. The five German lime kilns of 90,000-kg. maximum daily capacity are supplied with rock waste only. Assuming that one shaft kiln is to be fired with Ia limestone, and 75,000 kg. is required for this, a total of 285,000 kg. of Ia limestone is required for the plant, which corresponds to 63% of the volume of 450,000 kg. for the entire plant. Table 2 gives in percentage the proportion of the individual materials involved in delivery from the different deposits. It represents a



Drawing of German limestone quarry indicating quantity of limestone with high $CaCO_3$ content in proportion to other rock materials available in working stopes

TABLE 2. DISTRIBUTION IN PERCENT. OF THE VARIOUS SUBSTANCES OBTAINED FROM THE DIFFERENT DEPOSITS OF GIVEN DEPTH

Material	Depth m.	Deposits in series: Ia limestone	Cement rock	Small limestone	Waste rock	Distribution of the substances delivered in percent.: Marl	Refuse
Overburden	1.0	....	....	....	....	....	100
Marl	4.0	....	....	....	....	80	20
Claystone	3.0	....	80	....	....	10	10
Middle cement rock	3.0	....	90	....	....	....	10
Lower cement rock	2.0	....	90	....	....	....	10
Potter's clay	0.5	....	....	....	....	80	20
Shell deposit	2.0	60	....	15	15	8	2
Mosaic	1.5	60	....	15	15	8	2
Bl. gr. limestone	2.0	40	....	10	30	15	5
Rocky stone	4.0	60	....	20	15	5	....
Terebra deposit	0.9	....	....	....	....	100	....
Blue limestone	2.0	60	....	15	15	8	2
Slate limestone	9.0	20	....	10	10	55	5
Upper potstone	3.0	60	....	15	15	8	2
Potter's clay	0.5	....	....	....	....	80	20
Lower potstone	5.0	60	....	15	15	8	2

TABLE 3, SUB-TABLES 1 TO 6 WHICH GIVE THE FACE DEPTH OF THE DEPOSITS AND ALSO THE PERCENTAGE OF EACH RAW SUBSTANCE OBTAINED IN THE DELIVERY FROM A GIVEN NUMBER OF DEPOSITS STARTING WITH THE SHELL DEPOSIT DOWN TOWARDS THE QUARRY FLOOR—SEE TABLE 1

Deposits included Shell deposit to	Ia limestone	Small limestone	Waste rock	Marl	Refuse	Total
(1) Rocky stone: 9.5 m.	55.8	16.1	18.1	8.2	1.8	100.0
(2) Terebra limestone: 10.4 m.	50.9	14.7	16.5	16.1	1.6	99.8
(3) Blue limestone: 12.4 m.	52.4	14.7	16.3	14.8	1.8	100.0
(4) Slate limestone: 21.4 m.	38.8	12.8	13.6	31.7	3.1	100.0
(5) Upper potstone: 24.4 m.	41.4	13.0	13.8	28.8	2.9	99.9
(6) Lower potstone: 29.9 m.	43.8	13.1	13.8	26.2	3.1	100.0

most valuable foundation for estimating the operation and production of a quarry.

The sub-tables 1 to 6 of Table 3 have been compiled from the data given in Table 2, as follows: According to sub-table 1 in Table 3, the working face, measuring from the shell deposit to the "rocky" stone deposit, inclusive, is 9.5 m. Now, in column 3 of Table 2, the shell deposit is rated as 60% Ia limestone. This shell deposit is 2 m. thick, and 60% of this is 1.2 m. If the other deposits down to and including the "rocky" stone are converted in a similar manner, a total thickness of 5.3 m. is obtained; for 9.5 m. is the total height of the working face obtained by adding the depth of all deposits, of which 60% and 40% as indicated for each deposit, represents the thickness of available Ia limestone, namely, 5.3 m. These 5.3 m. of Ia limestone comprise 55.8% of the total delivery from the deposits considered in sub-table 1. The values for small limestone, waste, marl and refuse given in this sub-table are obtained in a similar manner.

The sub-tables 2 to 6 have been compiled in a similar manner and for different numbers of deposits starting with the shell deposit. The sub-tables show readily which combinations of deposits yield the largest percentage of deliverable Ia limestone. The deposits of upper and lower "potstone," which contain a very good limestone, have been determined by drilling as shown in Table 1. Even though these two deposits total 8 m. in thickness, they are not capable of increasing the percentage of Ia limestone in the delivery to the figures given in sub-tables 1 to 3.

According to these data, the quarry can supply daily about 225,000 kg. of Ia limestone, which represents 50% of the total delivering capacity. If, in order to operate one of the shaft kilns for producing stucco lime this percentage is to be raised to 63% which equals 285,000 kg., the quantity of the small limestone, waste, marls and refuse which is worked with it, increases in the same proportion. However, the capacity of the plants could not cope with this increase, since they are already utilized to full capacity. Yet, 285,000 kg. of Ia limestone could be delivered for limited periods at the expense of economy.

The author hopes that a method has herewith been shown which can be rendered useful in estimating in the operation of quarries.—*Tonindustrie-Zeitung* (1929), **53**, 63, pp. 1140-1142.

Alumina Cement in Germany. Dr. Haegermann states that the manufacture of alumina cement started in Germany about five years ago, at a time when the French had already 10 years' experience with it. There are only two plants in Germany manufacturing alumina cement and they cover the domestic demand fully. Each plant employs its own special process and the design and operating method of their smelting furnaces are patented. The high price of the alumina cement and also the high quality of certain portland cements have kept the application of alumina cement limited to special cases. In addition, the alumina cement requires special attention in preparing the concrete mix.

In order to overcome these disadvantages, the plants have changed from periodic operation of electric smelting furnaces and of water-jacketed furnaces to rotary kilns, ring kilns, shaft kilns (with smelting tub) or blast furnace (in which a high grade iron is produced at the same time). However, foreign bauxites must still be used. In order to compete with the high grade portland cement, more attention has been given recently to strengths after 12 hours. Instructions for mixing are furnished in every sack; however, more educational work is needed.

The most essential compounds of alumina cement are $CaO \cdot Al_2O_3$ and $5CaO \cdot 3Al_2O_3$. The average composition of the principal constituents is 40% CaO, 40% Al_2O_3, 10% SiO_2 and 10% Fe_2O_3. The limit values are as follows:

According to	CaO %	Al_2O_3 %	SiO_2 %	Fe_2O_3 %
Endell	35-45	45-60	5-15	.....
Berl and Loeblein	28-47	45-70	0-12	.....
Bied	40-45	30-45	10-12	10-20
Biehl	35-45	35-55	5-15*	5-15

*And 1-3% titanic oxide.

This great variation in the percentage content of each substance naturally results in great differences in the properties of alumina cement. The following limit values may be established for alumina cements available upon the market, according to Table I: 38.0-48.0% Al_2O_3; 35.5-42.5% CaO; 3.0-11.3% SiO_2; 2.34-16.0% Fe+FeO+FE_2O_3 (figured as Fe_2O_3). Endell and also Berl and Loeblein established their limit values upon the basis of their investigations in the three-component systems CaO-Al_2O_3-SiO_2, whereas the cements on the market contain besides also iron as ferric and ferrous oxide; the cement No. 12 in Table I belongs in the group of this three-component system. Cements Nos. 1 and 2 are of the year 1921 and 1924; the SiO_2 content has been reduced to less than 10% of late in nearly all alumina cements, for high SiO_2 content causes the strengths to increase but slowly during the first days, particularly in the absence of oxygen compounds of the iron. On the other hand, the iron has been given considerable importance in the alumina cement.—*Tonindustrie-Zeitung* (1930) **54**, 23, pp. 393-395.

TABLE I. COMPOSITION IN PER CENT OF GERMAN AND FOREIGN COMMERCIAL ALUMINA CEMENTS

Item	1	2	3	4	5	6	7	8	9	10	11	12
Insoluble	1.23	1.12	.....	2.70	0.44	.....	.....	.....	4.12	4.00	5.12	.....
Silicic acid	8.71	11.34	9.03	8.14	5.74	10.11	5.88	6.36	3.88	4.32	2.96	7.64
Titanic acid	1.31	†	†	†	†	1.74	†	†	†	†	†	†
Alumina	40.85	38.17	40.48	43.05	39.40	42.31	44.39	43.61	40.45	41.25	42.00	47.96
Lime	41.06	42.45	41.50	37.96	37.84	38.80	37.40	38.96	36.48	35.92	35.54	40.68
Iron	0.92	}	.....	}	}	.....	}	}	}	}	}	}
Ferrous oxide	5.86	} 6.31*	5.60	} 3.83*	} 16.00*	4.25	} 12.13*	} 9.79*	} 13.13*	} 14.11*	} 12.26*	} 2.34¶
Ferric oxide	0.62	}	0.97	}	}	1.80	}	}	}	}	}	}
Magnesia	0.37	0.36	0.56	0.61	0.32	0.61	0.29	0.62	0.65	0.11	0.53	0.22
Sulphuric anhydride	0.08	0.05	0.66	0.26	0.07	trace	0.05	0.58	1.20	0.54	1.18	0.09
Sulphide-sulphur	0.15	0.24	0.42	0.00	0.00	0.24	0.01	0.04	0.02	0.00	0.05	0.92
Loss on ignition	‡	‡	0.43	1.04	0.23	‡	0.33	0.45	0.10	0.31	0.16	‡
Remainder	.....	.....	0.35	2.41	.....	0.14	.....	.....	.....	.....	0.20	0.15

*Fe, FeO and Fe_2O_3 figured as Fe_2O_3. ¶Mostly Fe; all figured as Fe_2O_3. ‡Increase in weight on ignition. †Not stable or constant.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	June 28	July 5	June 28	July 5
Eastern	3,686	3,008	13,116	10,489
Allegheny	3,268	2,654	8,842	7,791
Pocahontas	620	460	1,792	1,511
Southern	655	577	8,617	7,659
Northwestern	1,460	1,282	9,775	7,419
Central Western	365	356	12,853	10,421
Southwestern	473	394	9,210	7,977
Total	10,527	8,731	64,205	53,267

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

	Limestone Flux		Sand, Stone and Gravel	
	1929	1930	1929	1930
	Period to date		Period to date	
District	July 6	July 5	July 6	July 5
Eastern	83,045	73,364	211,364	165,668
Allegheny	89,632	69,906	145,033	137,882
Pocahontas	9,586	11,093	19,843	27,524
Southern	13,515	17,794	218,612	196,070
Northwestern	25,499	23,930	120,671	103,749
Central Western	13,795	12,450	231,701	236,616
Southwestern	12,092	11,408	155,245	159,319
Total	247,164	219,945	1,102,469	1,026,828

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	1930
Limestone, flux	*247,164*	*219,945*
Sand, stone, gravel	*1,102,469*	*1,026,828*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of July 26:

SOUTHERN FREIGHT ASSOCIATION DOCKET

51228. **Stone, crushed, rubble or broken,** from Mount Airy, N. C., to Lyndhurst and Waynesboro, Va. It is proposed to establish reduced rate of 190c per net ton on stone, crushed, rubble or broken, in straight or mixed carloads (See Note 3), from Mount Airy, N. C., to Lyndhurst and Waynesboro, Va. Made on basis of scale prescribed in Docket 15216 (139 I. C. C. 88).

51235. **Stone, crushed,** from Riverton, Va., to stations on the Washington and Old Dominion Ry., Bluemont Division. It is proposed to establish rates on stone, crushed, carloads (See Note 3), from Riverton, Va., to stations on the Bluemont Division of the Washington and Old Dominion Ry., on basis of I. C. C. Docket 17517 scale, plus 25c per net ton. Proposed rates to representative destinations are: To Alexandria Junction, Va., 130c; Falls Church, Va., 140c; Sterling, Va., 150c; Purcellville, Va., 150c, and to Bluemont, Va., 160c per net ton.

51236. **Fluxing stone,** from La Follette, Tenn., to Middlesborough, Ky.; cancellation. It is proposed to cancel, on the obsolete theory, the present commodity rate of 80c per net ton on fluxing stone, carloads, from La Follette, Tenn., to Middlesborough, Ky. Class or combination rates to apply after cancellation.

51240. **Sand, gravel, slag, chert, etc.,** between Tuskegee R. R. stations and southern points. It is proposed to revise the rates on sand, gravel, slag, chert, etc., as described in Agent Glenn's I. C. C. A51, A655 and A668, between Tuskegee R. R. stations and points covered by tariffs just mentioned, to reflect the Trunk Line basis.

51322. **Marble, crushed,** from Boyd and Concord, Tenn., to eastern and Virginia cities and points taking same rates. It is proposed to revise the rates on crushed marble, carload, minimum weight 40,000 lb., in bags, carload, and in bulk, carload, to eastern and Virginia cities and interior eastern points, the same as now applicable from Louisville, Pinkmar and Marmor, Tenn. Statement of the present and proposed rates to the destinations here involved will be furnished upon request.

51376. **Sand, gravel, slag, crushed stone, etc.,** from Virginia shipping points to Wilmington, N. C., and intermediate destinations. It is proposed to establish rates on sand, gravel, crushed stone, slag, rubble stone, broken stone and chert, in straight or mixed carloads (See Note 3), from Alco, Blue Ridge, Eagle Mountain, Indian Rock, Klotz, Longcar, Longdale, Lynchburg, Miles, Pembroke, Pekin, Reusens, Ripplemead, Roanoke, Rocky Point and Rostoco, Va., to Wilmington, N. C., and intermediate destinations. Statement of the present and proposed rates will be furnished upon request.

SOUTHWESTERN FREIGHT BUREAU DOCKET

20609. **Silica rock,** from St. Clair, Mo., to points in C. F. A. territory. To establish rates on silica rock (ground), carloads (See Note 2), but not less than 60,000 lb., except when car is loaded to full visible or space-carrying capacity, in which case actual weight will govern, from St. Clair, Mo., to points in C. F. A. territory on basis of 10c per ton of 2000 lb. higher than present rates from Pacific, Mo. It is desired to establish rates on silica rock from St. Clair, Mo., that will place that point on an equitable basis with Pacific, Mo.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

20632. **Stone and marble,** from New Orleans to Tulsa, Okla. To establish a rate of 26c per 100 lb. on stone and marble, viz., crushed marble or marble chips, carloads (See Note 3), from New Orleans, La. (import), to Tulsa, Okla. The above rate not to include handling charge at port. The above rate is desired in order to clarify the situation as to the application of crushed stone rates on marble chips and crushed marble.

20659. **Agricultural limestone,** from Valmeyer, Ill., to Missouri points. To establish the following rates in cents per 100 lb. on agricultural limestone, carloads (for fertilizer purposes only), (See Note 1), but not less than 80,000 lb., from and to Missouri points shown below:

From Valmeyer, Ill.

To	Rate	To	Rate
Kimmswick	70	Fredericktown	100
Riverside	70	Glen Allen	100
Mineral Point	80	Lutesville	120
Bismarck	100	Allenville	100
Ironton	100	Delta	100
Sabula	100	Oran	120
Piedmont	120	Morley	120
Leeper	120	Charleston	120
Williamsville	120	Samos	120
Poplar Bluff	140	Jackson	120
Neelyville	140	Dudley	120
Loughboro	100	Dexter	120
Hardy	100	Sikeston	120

In order that Valmeyer, Ill., shippers may be placed on a competitive basis with Arkansas producers, it is thought that the same scale of rates should be made applicable from Valmeyer, Ill., as is published in Item 1756A, S. W. L. Tariff 114D.

20674. **Crushed stone,** from Marquette, Mo., to St. Louis, Mo. To establish a rate of $1.20 per ton of 2000 lb. on crushed stone, carloads (See Note 2), from Marquette, Mo., to St. Louis, Mo. The change proposed contemplates placing the Missouri Pacific R. R. on parity with that applicable via Frisco.

20717. **Chatt sand,** from Missouri points to points in Indiana. To establish the following route in connection with rates on chatt sand, carloads, minimum weight 100,000 lb., from Alba, Atlas, Aurora, Carthage, Granby, Joplin, Neck City, Oronogo, Porto Rico, Purcell and Webb City-Carterville, Mo., to Bedford, Coxton, Oolitic and Hiltonville, Ind. Mo. Pac. R. R., E. St. Louis, Ill., C. C. C. & St. L. Ry., Terre Haute, Ind., thence C. M. St. P. & P. R. R. It is the desire of the C. C. C. & St. L. Ry. to publish routing, as outlined above.

CENTRAL FREIGHT ASSOCIATION DOCKET

25491. To establish on **crushed stone,** carloads (See Note 3), from East Liberty, O., to Quincy, O., rate of 70c per net ton. Present rate, 80c per net ton.

25588. To establish on **sand and gravel,** carloads (See Note 3), Navarre, O., to Cleveland, O., for B. & O. delivery, rate of 95c per net ton. Present rate, 13½c.

25590. To establish on **sand, blast, engine, foundry, glass or molding,** carloads (See Note 1), from Bowes, Ill., to Michigan City, Ind., rate of $1.39, and to South Bend, Ind., rate of $1.60 per ton of 2000 lb. Present rates, class.

25603. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), from Point Pleasant, W. Va.

To	Prop.	Pres.
Brosia, W. Va.	60	80
Grim, W. Va.	60	80
Lyons, W. Va.	70	80
Poca, W. Va.	70	80
Wilsons, W. Va.	80	105
Mink Shoals, W. Va.	**90**	**115**
Coalridge, W. Va.	90	125
Sanderson, W. Va.	100	125
Hitop, W. Va.	100	125
Snow Hill, W. Va.	90	115
London, W. Va.	90	115
Cannelton, W. Va.	100	115
Smithers, W. Va.	100	115
Carbondale, W. Va.	100	115
Marting, W. Va.	100	115
Longacre, W. Va.	100	115
Gautley Bridge, W. Va.	100	115
Large Creek, W. Va.	100	115
Belva, W. Va.	100	115
Beech Glenn, W. Va.	110	140
Swiss, W. Va.	110	140

25608. To establish on **sand** (all kinds) **and gravel,** in open-top cars, carloads (See Note 3), from Akron, O., to Jefferson, O., $1.05 per ton of 2000 lb. Route—B. & O. R. R., Cleveland, O., N. Y. C. R. R. Present, 115c per ton of 2000 lb. per B. & O. R. R. Freight Tariff.

25612. To establish on **agricultural limestone, unburned,** in open-top cars only; **stone, crushed,** in open-top cars, in bulk only, and **stone screenings,** in open cars, in bulk only, in straight or mixed carloads, from Piqua, O., to South Bend, Ind., $1.45 per ton of 2000 lb. Route—Via Penn. R. R. direct. Present, classification basis.

25613. To establish on **limestone, agricultural** (not ground or pulverized); **stone, crushed,** and **stone screenings,** in bulk, in open-top cars in straight or mixed carloads (See Note 3), from Maple Grove, O.

To	Pres.	Prop.	Route
Ray, Ind.	Class	117	*
Montgomery, Mich.	Class	115	*
Reading, Mich.	Class	115	*
Bankers, Mich.	Class	112	*

*P. R. R., Toledo, N. Y. C. R. R.

25614. To establish on **stone, crushed, and stone screenings,** in bulk, in open-top cars, in straight or mixed carloads (See Note 3), from Kenneth, Ind., to Monon, Ind., rate of 80c per net ton. Route—Via P. R. R., Monticello or Reynolds, Ind., C. I. & L. Ry. Present rate, 75c.

25618. To establish on **crushed stone,** carloads (See Note 3), Keeport, Ind., to Ottawa, O., rate of $1.35 per net ton. Routes—Via Wabash Ry., Defiance, O., and B. & O. R. R.; via Wabash Ry., Napoleon, O., and D. T. & I. R. R. Present rate, $1.76 per net ton.

25619. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), from North East, Penn. (rates in cents per net ton):

To	Prop.	Pres.
Carl, Penn.	120	(1)130
Limestone, Penn.	130	(2)160

(1) Reidsburg, Penn., rate.
(2) Clearfield, Penn., rate.

25624. To establish on **crushed stone,** carloads

(See Note 3), from Melvin, O. (rates in cents per net ton):

To	Prop.	Pres.
Torch Hill, O.	80	140
Belpre, O.	90	140

25628. To establish on **crushed stone,** carloads (See Note 3), from Findlay to Deshler, O., rate of 50c per ton. Present rate, 60c.

25633. To establish on **sand and gravel,** carloads (See Note 3), from Wapakoneta to Arcadia, O., rate of 85c per net ton. Present rate, 13c.

25644. To establish on **sand and gravel,** carloads (See Note 3), from Marion, O., to Ohio points.

To	Prop.	To	Prop.
Horton	80	Raymond	70
Lunda	70	Ridgeway	70
Mentzer	70	West Mansfield	75

Present rates, sixth class.

25646. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), from Cleveland, O. From Central Freight Association territory to Official Classification territory, except Canada. (Rates in cents per net ton):

To	Prop.	Pres.
Geneva, O.	80	90
Madison, O.	80	90
Perry, O.	80	90

25647. To establish on **sand and gravel** (See Note 3), from Fort Harrison and South Terre Haute, Ind. (rates in cents per net ton):

To	Prop.	Pres.
Marco, Ind.	104	95
Linton, Ind.	107	95

25650. To establish on **sand and gravel,** carloads (See Note 3), from Winona Lake, Ind., to stations on the C. C. C. & St. L. Ry., viz.: Claypool, Silver Lake and North Manchester, Ind., rates of 70c per net ton to Claypool and Silver Lake, Ind., and 75c per net ton to North Manchester, Ind. Present rate, classification basis.

25664. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), from Pt. Pleasant, W. Va., to West Virginia points. Present rate, sixth class.

To	Prop.	Pres.	To	Prop.	Pres.
Two Mile	100	27	Dorfee	120	27
Etowah	100	27	Elkhurst	130	27
Barlow	110	27	Otter	130	27
Turner	110	27	Groves	140	27
Queen Shoals	120	27	Gassaway	140	27

TRUNK LINE ASSOCIATION DOCKET

24140. **Stone, crushed or broken, and stone screenings,** carloads (See Note 2), from Bittinger, Penn., to Westminster, Md., 80c per net ton. Rate to expire December 31, 1930. Reason—To meet motor truck competition.

24143. **Sand,** carloads (See Note 2), from Manumuskin, N. J., to Dorchester, N. J., 58c per net ton. Reason—To meet motor truck competition.

24149. **Crushed stone,** carloads (See Note 2), from Bethlehem, Penn., to Snyders, Penn., $1.10 per net ton. Present rate, $1.15 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

24150. **Crushed stone,** carloads (See Note 2), from Northampton, Penn., to Treskow, Penn., 90c per net ton. Present rate, $1.05 per net ton. Reason—Proposed rate is comparable with rates from White Haven, Penn., to Treskow, Penn.

24156. **Sand and gravel,** other than blast, engine, foundry, glass, molding or silica, carloads, and **crushed stone,** carloads (See Note 2), from Alfred, N. Y., to Hickox, West Bingham, Newfield Jct., and Brookland, Penn., $1 per net ton. (Present rate, $1.30 per net ton.) Reason—Proposed rate is comparable with rate from Alfred, N. Y., to Shongo, Nile and Wirt, N. Y., also to meet motor truck competition.

24199. **Sand and gravel,** carload (See Note 2), from Palmerton, Penn., to Weissport, Penn., 50c per net ton. (Present rate 60c per net ton.) Reason—To meet motor truck competition.

24205. **Sand and gravel,** carload (See Note 2), from Palmerston, Penn., to Hudsondale and Gerhards, Penn., $1 per net ton. (Present rate to Hudsondale 80c and to Gerhards, Penn., $1.10 per net ton.) Reason—Proposed rate is based on Lycoming Sand Scale P. S. C. Penn. Docket 7530.

24211. **Sand and gravel,** carload (See Note 2), from Pinewald, Toms River and Quail Run, N. J., to Jersey City, N. J., $1.61 per net ton via C. N. J.-L. V. R. R. (Present rate $1.73 per net ton.) Reason—Proposed rate is same as rate from Toms River to Jersey City via P. R. R.-C. N. J.

24215. **Sand and gravel** (other than blast, engine, foundry, glass, molding and silica), carload (See Note 2), from Alfred, N. Y., to Bradford, Penn., $1 per net ton. (Present rate $1.05 per net ton.) Reason—Proposed rate is comparable with rates to Killbuck, Salamanca and West Salamanca, N. Y.

24221. **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel,** carload (See Note 2), from Wyoanna and Falls, Penn., to Krebs and Ringtown, Penn., $1.30 per net ton. Present rate, $1.50 per net ton. Reason—Proposed rate is based on Lycoming scale as per P. S. C. Penn. Docket 7530.

24226. **Ganister stone,** carloads (See Note 2), from Cumberland, Md., to Baltimore, Md., $1.80 per net ton. Present rate, $2.50 per net ton. Reason—Proposed rate is comparable with rates from Berkeley Springs, W. Va.

24235. **Crushed stone and screenings,** carload (See Note 2), from J. C. Stahl, Penn., to Beaver Springs, Penn., 60c, and Selinsgrove, Penn., 70c per net ton. Reason—To meet motor truck competition.

24236. **Crushed stone,** carload (See Note 2), from Hendler, Penn., to Tresckow, Penn., $1.40 per net ton. (Present rate, $1.50 per net ton.) Reason—Proposed rate is comparable with rate from Wyoanna, Penn.

24253. **Sand and gravel** (other than blast, foundry, engine, fire, glass, etc.), carload (See Note 2), from Kenvil, N. J., to White Haven, Penn., $1.40, and Wilkes-Barre, Penn., $1.60 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

19983. **Common sand and gravel,** minimum weight 50 net tons of 2000 lb., from Scarboro Beach, Me., to Cumberland Mills, Me. Present rate, 60c per net ton on sand and run of bank gravel and 70c per net ton on screened or crushed gravel; proposed, 50c per net ton. Reason—To meet motor truck competition.

20129. **Molding sand** (See Note 3), from Mechanicville, Brookview, Niverville and Van Hoesen, N. Y., to Manlius, N. Y. Present rate, 10c; proposed, $1.70 per net ton. Reason—To establish a commodity rate comparable with other commodity rates now published.

20161. To cancel the present commodity rate of 80c per net ton on **stone, crushed,** in bulk, loaded in open-top cars (See Note 3), from Richmond, Mass., to Albany, Brookview, Hudson Upper, Mellenville, N. Y., as named in Items 1535 and 1540 of B. & A. R. R., I. C. C. 9129, and apply in lieu thereof mileage commodity rates as per B. & A. R. R., I. C. C. 9129. Reason—To cancel obsolete rates.

20191. To provide same rates on **limestone, pulverized,** in powder form, minimum weight 50,000 lb., from producing points in N. Y. N. H. & H. R. R., I. C. C. F-2943, to N. Y. N. H. & H. R. R. stations, as in effect on limestone (except agricultural). Reason—To provide commodity rates on comparable basis with rates in effect on limestone (except agricultural).

20291. **Stone, viz., granite, trap rock, quartz or sandstone, crushed or broken, including groat, rubble or chips** (waste products of quarries), (See Note 3), from Baileys, N. H., to various B. & M. R. R. stations, representative points shown below (per net ton):

To	Pres.	Prop.
Auburn, N. H.	$2.40	$0.85
Canterbury, N. H.	2.40	.75
Hooksett, N. H.	1.80	.75
Reeds Ferry, N. H.	2.10	.85
Wilson, N. H.	2.40	.85

20298. **Common sand and gravel,** minimum weight 50 net tons of 2000 lb., from Scarboro Beach, Me., to Deering Junction, Me. Present, 60c per net ton on sand and run of bank gravel and 70c on screened or crushed gravel. Proposed, 50c per net ton. Reason—To meet motor truck competition.

WESTERN TRUNK LINE DOCKET

4742H. **Sand, silica,** carloads (See Note 2), but not less than 40,000 lb., from Ottawa, Ill., to Charles City, Ia. Present rate, $2.40; proposed, $2.20 per net ton.

5435A. **Agricultural limestone,** carloads (See Note 3), but in no case shall the minimum weight be less than 40,000 lb., from Alden, Ia., to stations in South Dakota. No through rates in effect at present. Proposed—Same scale of rates as is now applicable in South Dakota on crushed, broken or ground stone and sand and gravel.

6800-A. **Blast, engine, foundry, glass or molding sand,** carload (See Note 2), from Dowes, Ill., to Michigan City and South Bend, Ind. Rates: Present—Class rates. Proposed—To Michigan City, $1.39 per ton of 2000 lb.; to South Bend, $1.60 per ton of 2000 lb.

ILLINOIS FREIGHT ASSOCIATION DOCKET

3330-J. **Sand and gravel,** carloads (See Note 2), but not less than 40,000 lb., from Chillicothe, Ill., to Astoria, Ill. Present, $2.20. Proposed, $1.26.

3638, Sub. 1—**Sand and gravel,** carloads (See Note 3), but not less than 60,000 lb., from Lincoln, Ill., to Menert, Fremont and Leslie, Ill. Rates per net ton. Present, $1.06. Proposed, 95c.

General Readjustment of Industrial Sand Rates in Prospect

THE INTERSTATE COMMERCE COMMISSION has issued notice of a hearing in Washington, D. C., September 9, on numerous cases involving freight rates in Eastern territory on sand for various industrial uses, other than aggregate. The official notice states:

INDUSTRIAL SAND CASES, 1930

Nos. 22907, 23377, 21091, 17817 (Sub-No. 1), 15833, 17822, 16296, 16250, 17060, 17272, 17272 (Sub-No. 1), 17272 (Sub. No. 2), 17338, 23019, 22098, 20554, 22476, 23111, 23111 (Sub-No. 1), 18725, 18725 (Sub-No. 1), 18718, 19978, 23340, 22338, 23245, 23226, 23446, 23560, 19743, 20803, 22053, 21849, 21486, 21553, 20733, 21133, 21133 (Sub-No. 1), 20828, 22289, 21383, 21136, 21396, 20230, and 21618.

NOTICE TO THE PARTIES:

This notice is issued pursuant to the understanding reached at the preliminary meeting of the parties before the examiner at Washington on June 10, 1930.

These cases are assigned for hearing September 9, 1930, 10 o'clock a. m., standard time, at the office of the Interstate Commerce Commission, Washington, D. C., before Examiner Fuller. These cases will be heard jointly with Docket C-8249 of the Public Service Commission of Pennsylvania.

On or before August 1, 1930, the shippers and receivers will forward not less than 10 copies of each of their exhibits to Mr. Webber, and not less than 10 copies to Mr. Aker, and not less than five copies to Mr. Newcomb, who will take care of the distribution of same to other representatives of the carriers.

The further hearing in the reopened cases will be limited to rates for the future only, the parties electing to stand on the present record in the respective opened cases in so far as reparation is concerned.

Any party desiring to have the previous record in any of the reopened cases made a part of the record in the cases now consolidated therewith must be prepared to comply with Rule XIII (b) of the Rules of Practice.

In so far as practicable, the exhibits to be offered at each day's session should be distributed prior to the beginning of the session.

The carriers will undertake to prepare an exhibit showing the actual movement of the commodity, in both open and closed equipment, together with the distances, for the months of June and July, 1929, from the producing points from which the rates are attacked as unreasonable in these proceedings.

Any party desiring to intervene but who has not yet filed a petition should be prepared to do so promptly at the beginning of the hearing. Only one petition will be required in the consolidated proceedings, but ample copies should be available for all concerned.

In so far as practicable, counsel desiring to participate in the cross-examination should agree on the order in which they should do so prior to the hearing.

The following order is suggested for the presentation of evidence:

By parties:

1. Shippers on direct.
2. Receivers on direct.
3. Carriers.
4. Shippers on rebuttal.
5. Receivers on rebuttal.

By origin districts:

1. Illinois.
2. Missouri.
3. Indiana.
4. Michigan.
5. Hancock-Berkeley-Springs-Mapleton.
6. Other Pennsylvania.
7. Ohio.
8. New York.
9. New Jersey.
10. New England.

By topics:

1. Nature and location of deposits.
2. Method of production.
3. Description of commodity.
4. Value.
5. Uses.
6. Competition.
7. Principal markets.
8. Advertising and designation of commodity in trade.
   a. Representative invoices.
   b. Specifications.
9. Type of equipment.
10. Average loading.
11. Volume of traffic.
    a. In box cars.
    b. In open-top cars.
12. Special services.
    a. By carrier.
    b. By shipper.
13. Loss and damage.
14. Rate structure.
    a. Rate history.
    b. Present rates.
15. Rate comparisons.
16. Other traffic evidence.

At the meeting of June 10 the parties pledged themselves to co-operate in avoiding unnecessary duplication of evidence.

It is the desire of the commission that the hearing be completed at the session beginning on September 9, or as soon thereafter as may be practicable and fair to all concerned, and the co-operation of the parties is invited to that end.

I. C. C. Decisions

22039. Cement. After directing the readjustment of rates on cement in accordance with the finding, the commission, by division 2, has dismissed No. 22039, Louisville Cement Co. vs. Pennsylvania railroad. The finding was that the local rate, 6.5 cents, Speed, Ind., to Louisville, Ky., collected on shipments of cement from the Indiana points to destinations on the Louisville and Nashville was inapplicable. The commission said that the only rates legally applicable on the shipments were the joint rates or combinations from point of origin to final destination.

The question arose because of a contract between the complainant and the L. and N. under which the complainant was to stand the cost of getting the cement to Louisville. The sale was on the basis of free on board cars at Louisville. The cement was bought for use on works of the L. and N. From Louisville to final destinations the cement was to be treated as company material. The bills of lading, however, were made out from Speed to the final destinations. Charges were prepaid to Louisville.

At first, the report said, the charges were collected on the basis of the division accruing to the Pennsylvania to Louisville or the proportionals to that point. Later the Pennsylvania exacted the local rate to Louisville, which the complainant contended was inapplicable and otherwise unlawful because the bills of lading showed the final destinations. The proportionals or divisions accruing to the Pennsylvania were lower than the rate to Louisville proper.

The commission said that in this case, through shipments were made, in good faith, from point of origin to final destinations beyond the junction point, and that the shipments should have been treated by the connecting lines exactly like ordinary commercial shipments, whatever disposition was made by the L. and N. of the charges that accrued to it for the movement over its own rails. On account of that holding the commission said that the allegations of unjust discrimination and undue prejudice, based upon the fact that the local to Louisville had been exacted, need not be considered. The shipments were made between July 21, 1925, and April 11, 1928. Attempt was made, but it failed, to settle the matter informally. The commission found that some of the shipments were barred by the statute of limitations and excluded them from the settlement to be made.

21755. Sand and Gravel Rates Found Unreasonable. The commission, by division 4, in No. 21755, McGrath Sand and Gravel Co. vs. Santa Fe et al., and a sub-number thereunder, Moline Consumers Co. vs. Burlington; No. 22267, Missouri Gravel Co. vs. Same; and a sub-number thereunder, Same vs. Burlington; No. 22422, Same vs. Burlington et al., and No. 22423, Same vs. Burlington et al., has found unreasonable and unduly prejudicial the rates on sand and gravel from Chillicothe, Ottawa, Sheridan, Yorkville, Aurora and Moline, Ill., and La-Grange and Reading, Mo., to destinations in Iowa on the Burlington, Rock Island and the Wabash, to the extent that they exceeded rates based on the Iowa interstate scale, with joint rates made on the 80% combination basis, in the past; and for the future to the extent that they may exceed rates based on a scale set forth in an appendix not herein reproduced. The new rates are to become effective not later than September 16.

The commission said that the scale prescribed for the future would remove the existing undue prejudice to the complaining interstate shippers and that there was no warrant in this record for requiring any changes in the intrastate rates in Iowa under sections 3 and 13 of the interstate commerce act. Reparation was awarded to the Moline Consumers Co. and Missouri Gravel Co.

The scale set forth in the appendix for the making of rates for the future begins with a rate of 80 cents a ton for single-line hauls in the block between 40 and 50 miles, and 95 cents for joint-line hauls in that block. The scale progresses in 10-mile blocks up to 170 miles; then two 15-mile blocks are inserted in it, followed by 30-mile blocks up to 350 miles. The single-line rate for the block between 90 and 100 miles is 105 cents, and the joint line 120. For the block between 185 and 200 miles the single-line rate becomes 150 cents and the joint line 160. The scale runs out with a block from 320 to 350 miles with a single-line rate of 195 cents and a joint-line rate of 200 cents.

I. C. C. Sand and Gravel Rates Upheld by Louisiana District Court

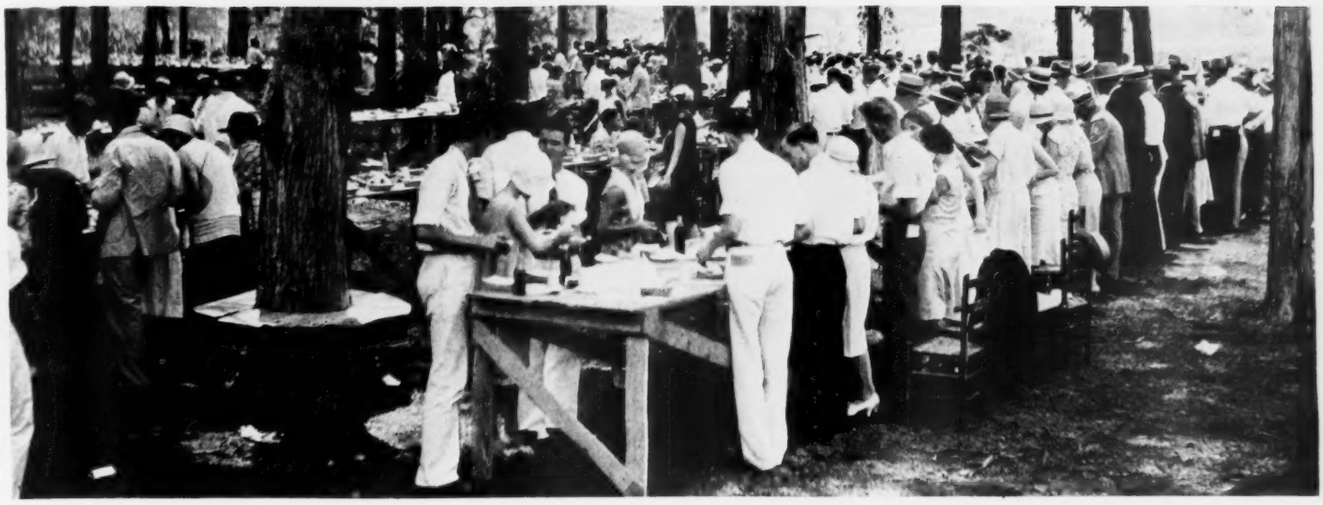
THE order of the Interstate Commerce Commission requiring that intrastate rates for the transportation of sand and gravel within the state of Louisiana be no lower than the interstate rates prescribed by the commission has been recently upheld by the District court at New Orleans, according to the *United States Daily*, Washington, D. C.

Another report from the *New Orleans* (La.) *Times* states that the state of Louisiana and the Louisiana Public Service Commission subsequently filed an appeal to the United States Supreme Court against this decision of the federal district court which on June 1 ruled in favor of the Interstate Commerce Commission, the Texas and New Orleans railroad and 24 other railroads and against the Louisiana Public Service Commission.

In the petition drawn for the appeal by the state of Louisiana and the Public Service Commission, it is contended that the orders of the Interstate Commerce Commission "did unlawfully and unduly invade authority of the state of Louisiana to regulate its internal commerce," and the plaintiffs also contend that the federal district court which heard the case in New Orleans erred in holding that there was substantial evidence before the Interstate Commerce Commission showing that the Louisiana intrastate rates caused discrimination or placed burden on interstate rates.

Sand and Gravel Rates From Georgia

THE Interstate Commerce Commission has received word from the Department of Justice that the three-judge federal court for the Atlanta, Ga., district has dismissed No. 563, Georgia Public Service Commission vs. United States and Interstate Commerce Commission, and the bill of the Georgia Highway Commission joined with it, in which the Georgia bodies asked to have the order of the commission in the southern sand and gravel case, 140 I. C. C. 85 and 160 I. C. C. 309, set aside. The court denied an interlocutory order in an opinion written by Judge Sibley and then dismissed the case on its merits after argument at Jacksonville, Fla., on June 24.



After the ceremonies at Spocari the crowd enjoyed a real southern "Alabam" style barbecue for which 25 pigs and 15 lambs had been roasted over a charcoal pit. It was a great day for the cement workers

Lone Star Mills Emphasize Safety

Four Additional International Subsidiaries Unveil Association Trophies with Fitting Ceremonies

DURING JULY four more cement plants controlled by the International Cement Corp. held celebrations at which Portland Cement Association safety trophies, awarded for operating throughout 1929 without lost-time accidents, were dedicated and unveiled.

Two of the earlier ceremonies of the same kind, held at the New Orleans plant and St. Stephens (Ala.) quarry of the Lone Star Cement Co. (La.) were reported in the last issue of ROCK PRODUCTS. Counting the New Orleans and St. Stephens operations as one plant, and adding the four additional plants by which trophies have been won, the International organization succeeded in operating one-half of its American plants during 1929 without an accident. This is a new record among "chain plant" companies, although the Lehigh group, operating some 17 mills, secured clear accident records at five of them during 1928. Either of these records, or the Alpha 1928 record of four plants out of nine, provide high marks for others to aim at.

At the Norfolk plant of the Lone Star Cement Co. (Va.) the celebration was held on Thursday afternoon, July 10. On the following afternoon at 2:30 similar ceremonies were conducted at the Nazareth plant of the Lone Star Cement Co. (Penn.), while the Lone Star Cement Co. (Ala.) celebrated at its Birmingham plant on Tuesday, July 15, and at its Spocari plant on Wednesday, July 16. H. Struckmann, president of International, was unable to leave New York to attend these various occasions, so E. Posselt, vice-president, was present as representative of the executive department of the parent organization. However, to indicate his warm personal interest in the fine safety work within the winning mills, Mr. Struckmann sent a letter expressing his appreciation to the executives of the three subsidiaries mentioned above, who read it as a general communication from the president to his employes.

Norfolk Organization Jubilant

The operating organization at the Norfolk plant has been actively campaigning for the trophy for five years and missed it by a single accident in 1926 and 1928. Among the prominent guests to arrive for the dedication ceremony were Mayor B. H. Gibson of the city of South Norfolk, in which the plant is located, the entire board of aldermen and all of the city department heads; Col. Charles B. Borland, director of public safety, city of Norfolk, and Frank P. Evans, statistician of the Industrial Commission of Virginia, Richmond. Representing the International Cement Corp. was E. Posselt, vice-president, New York. A. J. R. Curtis represented the Portland Cement Association. General Superintendent William Moeller of the eastern International mills, who bashfully remained in the background, was loudly acclaimed as one of the chief sources of the inspiration which made the perfect safety record possible.

The formal program included a welcome and introduction of guests by Dwight Morgan, vice-president, Lone Star (Va.); the presentation of the trophy, by A. J. R. Curtis, and its unveiling by Miss Mildred White, daughter of L. F. White, master mechanic. Acceptance of the trophy for the plant was made by G. F. Martinez, superintendent. Then followed addresses by E. Posselt, Col. Charles B. Borland,

Members of the 1929 Safety Committee at Birmingham, Lone Star, were as follows: W. M. Cabaniss, superintendent (chairman); L. L. Lloyd, assistant superintendent; J. M. Henderson, deceased, general mill foreman; H. M. Zimmerman, chief chemist; W. T. Dowdle, rock quarry foreman; G. W. Winston, mill foreman; J. W. Anders, mill foreman; G. N. Pierce, chief electrician; C. B. Hall, pack house foreman; A. W. Raaf, chief clerk, and W. C. Powell, cost clerk

Mayor B. H. Gibson and Frank P. Evans.

In the course of his remarks Mr. Posselt said:

"It is particularly gratifying that your safety record is being recognized by the authorities and the people of this city and of the state of Virginia. I can assure you, Col. Borland, that such leadership as yours is a great inspiration to all of us, and I take the opportunity to state that we greatly appreciate the advice and assistance and cooperation we receive so freely from the public authorities.

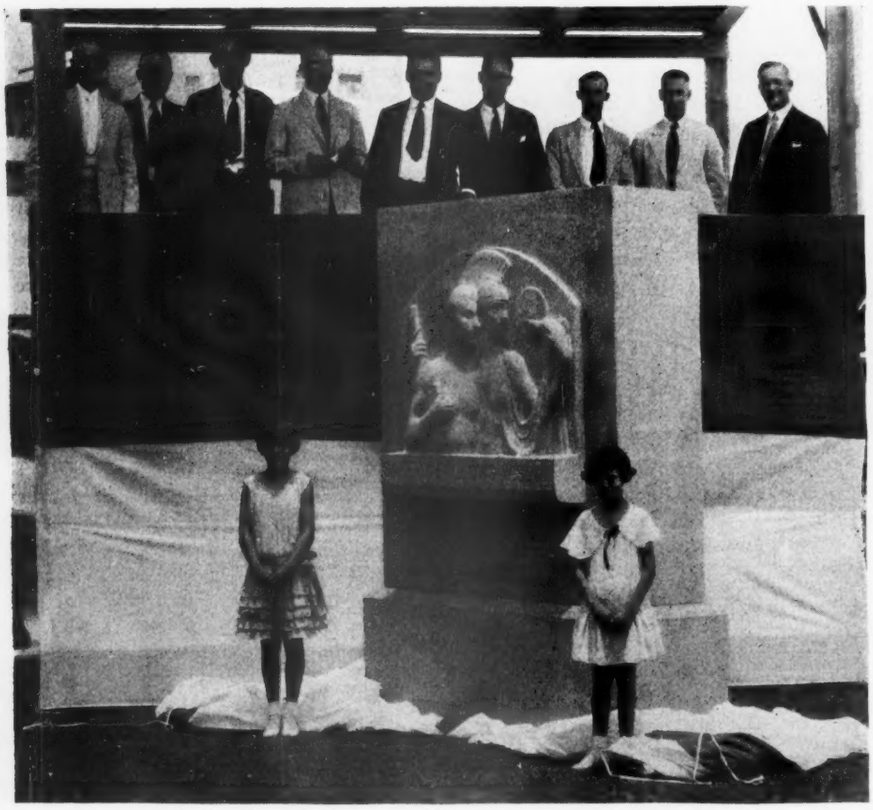
"To be good citizens cannot fail to bring personal satisfaction, and this organization considers it a duty to work and live safely in the community. It is not many years ago that it was considered a sign of activity and prosperity when great clouds of black smoke were belching forth from smokestacks, that plants to be busy must be dirty and in disorderly condition, and that accidents were a necessary evil in industry.

"Today modern engineering has eliminated smoke—only waste gases and vapor escape through the chimney—and industrial accidents have been practically eliminated and even minor accidents are now considered avoidable and a disgrace in industry.

"So in closing I express the hope that the accident record established at this plant may continue unblemished and that the beautiful white smoke may continue to flow from the three tall chimneys in front of us as a sign of activity, prosperity, happiness and contentment."

The 1929 Safety Committee, Lone Star, Spocari, Ala., plant; top row, left to right, J. H. Honeycutt, R. A. Gable, A. L. Kilgore, W. W. Deadman, E. H. Glasscock; lower row, R. M. Braden, C. C. M. Harper, H. C. McClusky, J. C. Pearson and Sam Hemmett

At the close of the ceremonies a picnic supper was served in the plant yard, with Superintendent Martinez and a competent committee in charge. Outside of the special guests of the occasion mentioned above, the entire party was composed of the employes and their families, the affair turning out to be a most enjoyable family picnic. The accompanying illustrations speak for themselves.



At Spocari, Ala., Lone Star dedication. In the speakers' stand are, left to right, Rev. W. F. Cann, Demopolis, Ala.; A. D. Stancliffe, general superintendent, Birmingham; Judge Benjamin F. Elmore, Demopolis; R. M. Braden, assistant manager, Spocari; E. Posselt, vice-president, International Cement Corp., New York City; J. W. Johnston, vice-president and general manager, Lone Star, Alabama; W. W. Deadman, superintendent, Spocari plant; Arthur Akers, writer, Demopolis, and A. J. R. Curtis, Portland Cement Association, Chicago. Phyllis Honeycutt and Claudia Pearson unveiled the trophy

Enthusiasm High at Nazareth

At the Lone Star organization celebration for the Nazareth (Penn.) mill on July 11 there were present on the rostrum representatives of all of the cement mills in the Lehigh valley and a few from more distant plants. Music was provided by the Pen Argyl high school band, well known throughout Pennsylvania. The International corporation was represented by Mr. Posselt, T. Avnsoe, vice-president in charge of operations, and William Moeller, general superintendent in charge of the eastern division. The association was again represented by Mr. Curtis.

The entire working force of the plant, led by the band, marched from the main mill building to seats provided in the parkway in front of the office building, where three or four hundred persons, representing families, friends and local celebrities, already awaited the hour for the ceremonies. Donald S. MacBride, vice-president of Lone Star (Penn.), acted as chairman and master of ceremonies, the program being as follows: The trophy was unveiled by Misses Arleyne E. Heims and Evelyn M. Messinger, and was accepted on behalf of the plant organization by E. C. Champion, superintendent. The address for the occasion was by Hon. W. R. Coyle, member of Congress from the Lehigh valley district.

Following the trophy ceremonies a novel feature was provided by publicly awarding first-aid training certificates to 16 members of the mill force who recently completed a course under the direction of the United States Bureau of Mines. The presentation was conducted by Jesse Henson, senior foreman miner of the bureau, after a short address in which he praised the progress in first aid being made by the cement mills. Certificates were awarded to Leslie Abel, Harold Gogel, William Gorman, Granville Graver, Willis L. Johnson, Frank Lkeipeisz,

At Ormrod, Penn., the Lehigh Portland Cement Co. held impressive ceremonies in front of the office building when Plant No. 3 rededicated its trophy and Plant No. 2 unveiled its Portland Cement Association award

Alex Marakovitz, Edward Norris, Joe Seracky, Arthur Stofflet, Walter Solt, Tony Sousa, Stanley Tokarhlehe, Joe Tonheiser, Hermie Vogel and Milton Weiss.

Offer Paid-Up Insurance

After the award of the certificates, Mr. Posselt, representing the directors of the International Cement Corp., presented every employe who had been on the payroll over six months with a paid-up insurance policy. In awarding the policies Mr. Posselt said: "These life insurance policies are issued in the amount of $500 as soon as an employe has been six months with the company. At the end of the first year it is increased to $600 and thereafter it increases $100 per year until it is $1,000. Whatever the amount in effect at the time will be paid to the family or heirs of any employe when the time comes when he is called beyond and passes on from any cause whatsoever. Your company pays all the premiums.

"Similar group insurance has been in effect in the other subsidiaries for several years, and up to the end of 1929 we have paid out to the families left behind a total of $95,800."

Big Day at Birmingham

At the Birmingham (Ala.) mill, where the festivities were conducted on Tuesday, July 15, arrangements had been made for an enjoyable party, and, since the occasion was planned to take the form of a great family party, only a few local guests were invited. They included P. J. Prewitt, director of the Birmingham Safety Council, and R. H. MacFetridge, superintendent of the Birmingham mill, Lehigh.

J. W. Johnston, vice-president of Lone Star (Ala.), presided. Mr. Posselt and A. D. Stancliffe, general superintendent of the southern division, appeared for the management of the parent International company. The program, similar in arrangement to those previously reported, included the unveiling of the trophy by Misses Juanita Chumbler and Lovaine Elliott and its acceptance by W. M. Cabaniss, superintendent. Addresses were made by A. D. Stancliffe, E. Posselt and Dr. Allen G. Loehr.

Town Turns Out at Spocari

The fourth of the present group of Lone Star trophy parties took place at the Spocari (Ala.) mill on Wednesday, July 16.

The mill town of Spocari lies but a short distance from the city of Demopolis, which has taken a lively interest in the cement mill since its establishment there about 20 years ago. Consequently, the celebration at Spocari turned out to be a real community affair. Public officials, distinguished citizens, friends and families of the mill organization all came to the mill to applaud the fine safety record, express their admiration and to assure visiting officials that the plant was appreciated by the community and that all local efforts would be bent to insure its successful operation.

R. M. Braden, assistant manager of Lone Star (Ala.) was master of ceremonies. The formal program of exercises opened with the singing of "America," after which the invocation was offered by Rev. W. F. Cann, pastor of the Methodist church of Demopolis. Mr. Curtis presented the safety trophy, it was unveiled by Misses Phyllis Honeycutt, daughter of J. H. Honeycutt, and Claudia Pearson, daughter of J. C. Pearson, and after a short speech of acceptance by Superintendent W. W. Deadman, addresses were made by Vice-President Posselt, General Superintendent Stancliffe, Vice-President and Manager Johnston, Arthur Akers of Demopolis, writer of negro stories, and Circuit Judge Benjamin F. Elmore. After a barbecue feast in southern Alabama style, in which 25 pigs and 15 lambs were roasted over a charcoal pit, a program of field events took place, including tug of war, sack races, three-legged race, ladies' obstacle race, ladies' spoon race, and an adventure with a greased pig. There was a ball game between the "Incorkers" and the "He-Clinkers," and the climax was reached in a six-round boxing bout between Mingo Nixon and Jesse Robertson, star colored boxers of the Spocari organization.

Ormrod Organization Celebrates

WORKERS of Ormrod (Penn.) mills Nos. 2 and 3 of the Lehigh Portland Cement Co. spent June 18 in a grand jollification and a fitting ceremony when a Portland Cement Association safety trophy, bestowed for a clear safety record in 1929, was unveiled and dedicated at mill No. 2. On the same day a similar trophy, bestowed by the association on mill No. 3 for a perfect safety score in 1928, was rededicated, bearing a new inscription commemorating accident-free performance during 1929.

To the workers at the Ormrod mills, as well as the executive and operating officials of the company, the achievements in safety work at the Ormrod plants have been very gratifying. That the safety idea permeates the entire Lehigh organization was stressed in the address of J. B. John, chairman of the committee on accident prevention of the association, who journeyed to Ormrod in order to personally present the trophy at the mill where he first went to work in the industry over 30 years ago.

The program was opened with a concert by Klinger's municipal band. Superintendent W. J. Montz introduced Lt.-Col. H. A. Reninger, in charge of Lehigh safety and welfare work, who presided. Rev. Simon Sipple, pastor of the "Liberty Bell" church

of Allentown, offered the invocation, after which the children of the Ormrod public schools sang "America."

Mr. John presented the new trophy. In so doing he highly complimented the men of the Ormrod mills, a large group of whom still remembered him as "Jack John" of the repair gang. Misses Marjorie Miller and Pauline Lobach unveiled the new monument for mill No. 2 and Marie Helfrich and Dorothy Laub drew the sheets from the newly inscribed monument won by mill No. 3 a year ago. Acceptance of the trophies was made by Superintendent William J. Montz.

Col. E. M. Young, president of Lehigh, expressed his gratification and that of the Lehigh directors over the results of the safety campaigns in the company's mills.

Lehigh Safety Committee for Plants Nos. 2 and 3, Ormrod, Penn. Seated, front row, left to right, Elmer Schoemaker, Luther Knerr, Alfred Balliet, Herman Wetherhold, John Frickert, Dennis O'Donnell, Lawrence Simmons, Willard Guth; second row, seated, Anson Stittler, Lloyd Diehl, George C. Fullager, William J. Montz, Ida J. Schock, C. P. Benner, Samuel P. Helfrich, F. E. Laubach, Russell H. Marsh; third row, O. A. Griesemer, B. F. Roth, Norman Sell, Charles Phifer, Charles Rabert, William Nipch, Lewis Steckel, Paul Dreisbach, Samuel Laub; fourth row, Fred Lobach, Mike Ballas, Perry Acker, Fred Agats, Herbert George, B. F. Clauser, G. C. Snyder, Henry Masonheimer, Sylvanus Miller and George Leibensperger

Protective Clothing and Devices as an Aid to Safety*

By E. F. ALDERTON

Superintendent, North American Cement Corp., Martinsburg, W. Va.

MEN CLOTHE THEIR BODIES to satisfy their needs for protection and to gratify their desires for comfort, but few working men select their clothing to meet the best requirements for safety.

The attitude of the human mind towards clothing is largely affected by its appearance to others. If we think we look well to others in the clothing we wear, we feel better and do better work. Progressive management is using this bit of psychology not only to increase production, but to decrease accidents.

While we can hardly classify goggles as clothing they are, nevertheless, one of the most important items of safety wear in our industry. Some companies make it compulsory that every man on the job have a pair of goggles and wear them when needed. Our company strictly enforces this rule.

In years gone by we experienced many accidents to the feet. After careful investigation we found a shoe with a safe toe which we offered to the men at cost, cheaper than the average shoe which the workmen had been buying. These shoes have been the means of preventing several bad accidents in our plants during the short period we have been using them. They are especially adapted to the needs of men who handle material and where there is danger of stones or other objects falling or rolling on the feet.

Some of the companies experience mud ring trouble in their kilns and in this connection a considerable number of men have received bad burns from going into the kilns without proper clothing. This is especially true when a man wears a pair of shoes half tied up or with holes in the soles. A pair of asbestos leggings and a good tight pair of shoes well laced will prevent accidents in situations of this kind.

The machine shops throughout our industry have had bad accidents due to improper clothing. The man on the lathe or shaper should not be allowed to wear a necktie and his clothing should not be ragged or have loose sleeves. Many accidents in our industry can be traced directly to the men being permitted to wear overalls with long cuffs turned up outside. We have a rule that these overalls shall neither be cut off or turned up on the inside. Rubber gloves prevent accidents and should be worn when needed.

Safety belts are very useful in our industry and should be worn in several departments. In the crusher department, especially

*Read at Regional Safety Meeting of the Portland Cement Association at Washington, D. C.

Employes and families celebrating unveiling of safety trophy at the Nazareth Lone Star plant

when the crusher chokes up, a man hooking stone with a long hook is likely to fall into the crusher if not protected with a safety belt.

Many accidents to the head would have been prevented by supplying the workmen with "hard boiled" hats. These are not very comfortable at first, but the workmen soon get used to them. These hats should be worn particularly around the quarry or in any other departments where there is any danger of falling material.

Another thing that will help to make a shop safe is good housekeeping. Keep the floor and walkways free from rubbish and scrap. It is good practice to put scrap in its proper place as fast as it is made and to store usable scrap in a safe and workmanlike manner.

Another practice that helps prevent accidents is to bring jobs into the shop only as they can be handled. Avoid cluttering up the shop with jobs that can not be done for several days and create stumbling blocks in the meantime. When a job is completed it should be properly placed and the job next in importance brought in. Cement mill machinery and equipment is cumbersome and heavy and is unsafe when allowed to lie around.

Safe Practices in Cement Mill Shops*

By H. A. Tillotson

Chief Engineer, Petoskey Portland Cement Co., Petoskey, Mich.

I DO NOT EXPECT that everyone here will agree with all that I say because we do not all see things from the same angle. My subject is almost as big as a cement mill and as varied as the colors of a Petoskey sunset.

Shop men are called upon to work on anything from kilns and Hercules mills to the most delicate equipment, such as sewing machines and fine electrical instruments. The work has to be done, not only in the shop, but in all parts of the mill, perhaps in the basement or up near the roof where the heat is often intense. We must be ready to make repairs where working conditions are very often at their worst. The shop crew must be ready for any emergency, they must know how to meet any and all conditions in a safe as well as an efficient manner.

This meeting is made up of men who come from plants where there is a safety organization of one kind or another and you men know what constitutes safe practices, making it unnecessary for me to go into details on the many things you meet in your daily work. You all know you should wear goggles when chipping and when using an emery wheel. You know you should store oxygen and acetylene tanks in a safe manner and you know you should put up a shield around the electric welder.

While the conditions in one plant are very similar to those in another there are, of course, details that vary with each particular situation and must be met by the men doing the job. The point is to use your head for something besides holding your ears apart. Rules and standing orders are all very good for some things and safe guards are all right for other places; but the best safety device is a careful and thoughtful worker.

Would you say that safety was uppermost in the mind of a man who stood on one side of a steel plate while his fellow worker on the other side burned the edge off with an acetylene torch, the hot metal and sparks flying all around him? Do you think the pipe fitter who climbed down from the top of a steaming boiler and jumped on a quarter inch pipe leading to the water column was thinking safely, if thinking at all? And how about the electrician who went in behind the switchboard to test a 2300 volt fuse with an ordinary test lamp? It is such carelessness which must be eliminated before we can have entirely safe plants.

*From a paper read at the Detroit Regional Safety meeting.

Hazards in the Power Department*

By P. G. Pellegrom

Chief Electrician, Alpha Portland Cement Co., Bellevue, Mich.

HAZARDS in the power department of one cement mill correspond closely with hazards existing in the power department of practically every other mill. As an electrical foreman interested in his work and desirous of maintaining a high degree of efficiency in his department but at the same time concerned with the safety of his men, I wish to mention a few of the salient points of an individual code that I have adopted and one which I believe has been largely responsible for the excellent showing my department has made. The last lost-time accident recorded in the power department of the Alpha Portland Cement Company's Bellevue plant was on January 9, 1925, and that resulted in only three days loss of time. Our average man-hours run about 1250 per month.

First on this safety program that I endeavor to maintain, is the rule of never allowing myself to be absent from my men for any great length of time while in the course of their work. No matter how small the job may be, I feel that the personal attention of the foreman is demanded and especially is this true when inexperienced men undertake a hazardous piece of work. I never ask my men to attempt a task which I myself would shun.

In starting a new piece of machinery following its installation, it is my duty to be the first man to set it in motion. Should a dangerous situation arise through faulty or incorrect workmanship, it is the foreman's responsibility to be on hand to cope with an emergency and not leave it to his less experienced assistants.

In the case of new employes, I make a special effort to accompany them on their first trip over the ground upon which they are to work. During this initial or trial trip I point out the hazards to which they must give attention for their own welfare. By this manner of acquainting the new man with his work, he becomes cautious, painstaking and reliable; less of a risk to his employer.

Our mill, like many others, is equipped with and controlled by hand starting compensators that offer a certain degree of danger unless the workman is properly instructed in safe methods of handling them. It has been my endeavor since assuming charge of the electrical department of our plant to educate the men to always use their left hand in gripping the starting handle of a compensator. With the starting handle fixed to the right-hand side, this precaution makes the operator stand at the side and thus he is safely removed from the line of danger in case of a short circuit.

In the personnel of an electrical crew, it is my belief that as near as possible every man should be what I might term a "cool" type of individual—one not easily excited or given to nervousness. A nervous man is one of the biggest risks that an electrical department can have. Given my choice, I would sooner hire the level-headed, inexperienced man than I would the highly trained electrician of a nervous temperament.

As a recommendation in the interest of increased safety, I would suggest to those mills not already so equipped, that a remote control system be installed in the power department whenever new equipment is purchased or replacements are made. This method removes the operator far from the zone of danger when starting a machine and prevents the possibility of accidents so common to the old system.

*From a paper read at the Detroit Regional Safety meeting.

Physical Examination of Employes*

By E. S. Guth

District Manager, North American Cement Corp., Hagerstown, Md.

IT IS difficult to measure the value of physical examination of employes. There are many things the intangible results of which are known to be substantial but for which it is difficult to establish a measure of value, and physical examination rather falls in that class. However, we will consider some of the general aspects and requirements of such examinations and attempt to state some of the advantages to be derived therefrom.

The examining doctor should have the professional ability to properly conduct the examinations, should have some degree of knowledge of the plant and manufacturing process, and should be sympathetic in his attitude toward the men. The doctor can fulfill his duty to the company and at the same time perform a real service for the workmen.

A safety magazine article recently gave the following definition of a good doctor: "A real doctor is not alone a man who dispenses medical or surgical advice and care, but one who, while doing these things, tries to assist the patient to help himself to a true understanding of his inner nature and his vital daily problems. When one is in distress or bodily pain he usually becomes fearful, and fear makes us try to help ourselves, particularly if someone seems interested to help us just a little."

In addition to giving the worker general instructions about the care of his health, the doctor should give some instructions about occupational diseases and hazards. This preliminary instruction should be followed by more detailed instructions given to the worker by the personnel department and foreman. An executive of a large manufacturing company estimates that 15% of accidents are due to improper instruction of the workmen and that probably an additional 5% is due to worry because of ill health and other troubles.

The result of the doctor's examination should be used as a guide to the placement of the worker or his rejection. Grounds for rejection are usually serious functional disorders of heart, kidneys, and lungs, and hernia, defective vision, venereal disease, rheumatism, etc. The rejection of would-be workers is frequently humanitarian rather than otherwise, for it is not unkind to prevent a man working at a job where he is almost certain to be hurt eventually. The fact that all workers are in sound physical condition is surely an excellent accident deterrent.

In some quarters the age of workers is given serious consideration and men over certain ages are refused jobs. It seems that the physical and mental condition of the worker, rather than his age, should be given the greater consideration. There are millions of men over forty-five hard at work every day and doing good work. Such men are likely to be more stable and companies employing them will have a lower labor turnover. Workers of such ages are more cautious and the incidence of accidents is probably lower for that reason. The examination of workers at cement plants is becoming more general and it may be that this fact is partly responsible for the steady improvement in the accident record of the industry.

A careful record should be kept of the examination data. A form developed for this record is shown. This form was worked out following the study of over fifty forms used by other companies and industries, and it is designed to show in sufficient detail all the essential items relating to physical condition. These records should be considered private and should be kept in locked files.

The chief objects of physical examinations are as follows:

1. To determine the presence of serious organic disease.
2. Placement of worker in occupation which suits him best.
3. Detection of presence of defects so that worker may correct them.
4. Prevention of spread of communicable disease.

Some of the advantages to be derived therefrom are as follows:

1. Lessened frequency of accidents.
2. Reduced possibility of unjust claims for injuries.
3. Proper placement of workers.
4. Reduction of absenteeism.

*From a paper read at the Regional Safety Meeting of the Portland Cement Association, Washington, D. C.

North American Cement Corporation

PHYSICAL EXAMINATION

DATE.....

Name..... Address..... Check No.....

Birthplace..... Age..... Sex..... Color..... Marital Cond..... M. S. W. D.....

Height..... Weight..... Posture— Erect..... Stooping..... Remarks.....

General Appearance— Good..... Fair..... Poor..... Attitude— Cooperative..... Antagonistic.....

Eyes— Pupils React { Light R..... L..... Accom. R..... L..... } Vision { Without Glasses R..... L..... With Glasses R..... L..... } (Consider 20 Ft. as Normal)

Ears— Hearing { R..... L..... } (Watch 3 Ft. is Normal) Canals.....

Nose— Septum..... Turbinate..... Catarrh.....

Throat— Tonsils..... Pharyngitis.....

Teeth— Pyorrhea..... Decay..... Impaired Mastication.....

Glands..... Veins.....

Blood Pressure..... Arterio Sclerosis..... Flat Feet.....

Nervous System— Reflexes Normal..... Tremors..... Remarks.....

Chest— Shape..... Circumference { Normal..... Ins..... Exp..... } Expansion.....

Lungs— Resp. Rate..... Rales..... Location.....

Bronchitis..... Pleurisy..... Tuberculosis.....

Remarks.....

Heart— Pulse Rate..... Regular Irregular..... Murmurs..... Enlarged.....

Pulse Rate {Immediately After Exercise..... Pulse Rate {Three Minutes After Exercises..... Remarks.....

Hernia..... Easily Reducible..... Truss Worn.....

Remarks..... Enlarged Rings..... Hemorrhoids.....

Abdomen— Tender..... Location..... Area.....

Deformities.....

Venereal Diseases— Syphilis..... Gonorrhea.....

Laboratory Tests— Blood..... Urine.....

General Remarks.....

Advice Given..... Classification.....

√ = Yes or Slight Degree o = No
\+ = Medium Degree − = Could Not Answer
\+ + = Extreme Degree

Examining Physician.....

Form used by North American Cement Corp. for examination data. It is considered private and kept in locked files

Infringement Suit Against Haydite Co. Dismissed

Incidentally, the History of Burned-Clay and Shale Aggregates

IN THE CASE of the Silica Products Co. versus the Haydite Co. and the Western Brick Co. charging infringement of a patent covering a process for making a light-weight, burned-clay or shale, concrete aggregate, the U. S. Circuit Court of Appeals for the Seventh District, Chicago, Ill., recently affirmed the decree of the District Court, dismissing the appellant's bill.

The findings were that the Hayde patent antedated the Olsen patent and also that while the Hayde patent did not specifically refer to an expanded or porous material suitable for concrete aggregate and materially lighter in weight than concrete aggregates previous used, still all the evidence in the case showed that for several years prior to his application for a patent Hayde had been actively experimenting for the production of such a light-weight aggregate, and that his discovery had been reduced to a practical basis previous to the filing of the Olsen patent.

Also the claims in Olsen's patent upon which infringement was charged did not in the court's opinion show clearly a method or process for producing a light-weight aggregate from shale, while Hayde's patent gives in detail the process of manufacture by which they have been making such material. Hence in the court's opinion there has been no infringement.

Hayde Patent

The patent to Hayde, No. 1,255,878, February 12, 1918, application filed July 3, 1917, claims:

"The basic raw material employed in making brick or analogous articles in accordance with my invention is argillaceous or clayey in character, and is a material which will harden or form a clinker when subjected to a high temperature during the burning step of the process."

It says that the basic raw argillaceous material may be clay, shale, shale rock or like material, having gravel, sand or other substances ordinarily detrimental to the use of argillaceous material for brick making; and the process of burning it, and the result, is thus described:

"The raw material is next burned in a rotary or other type of kiln at a high temperature and for a comparatively short time. This burning temperature should be in excess of 1500 deg. F., a temperature of from 1700 deg. to 2200 deg. F. having been found suitable in the case of most raw argillaceous materials thus far employed in carrying out my process; and the said high temperature is maintained for a period of about two hours, as this treatment has been found to be the best suited for most raw materials. During this operation the material or the argillaceous constituent thereof is converted into hard dense particles and clinkers, and it assumes such a state that it will withstand the action of the elements without disintegration, and it becomes a resistant material not liable to change when the brick or other articles of which it forms the base and principal part are built into a permanent structure. The high temperature to which the material is heated eliminates all silt therefrom, and the resulting burned material consists of indurated clay, inert material not changed by the high temperature to which the raw material is subjected, and lime to the extent that lime producing material is or may be present in the raw material employed, all of which depend upon the characteristics and composition of the original material, as will be appreciated."

There is pointed out with much detail the process of cooling the substance, crushing it, treating it with water to slake the lime therein, mixing it with other ingredients and then molding it into brick or other articles. It is pointed out that whereas in ordinary brick-making the molded bricks are fired at moderate temperature for about five days, and then at much higher temperature for about the same time to burn them, under the process of the patent "the only heating necessary is that to which the basic composition or raw material is subjected during the burning step of the process, and which is ordinarily completed in about two hours." The advantage in articles thus made is stated to be that they are "well adapted to resist and withstand the action of heat, as well also as the disintegrating action of water applied to them when they are in a heated condition, as commonly happens in a fire; and it has been found in practice that they are but slightly affected by the action of heat and water at such times, and do not pop, crack, craze or disintegrate to any considerable extent under the above mentioned and similar adverse treatments or circumstances."

Olsen Patent

The patent to Olsen, No. 1,314,752, September 2, 1919, application filed May 22, 1918, claims:

1. A composition of matter comprising a mixture of coarse and fine pieces of shale rock which have been burned but not clinkered.

2. The method of making concrete which consists in burning without clinkering shale rock, crushing the burnt material into fine and coarse pieces and mixing a mixture of said fine and coarse pieces with a binding material.

3. An article of manufacture comprising naturally decomposed shale rock which has been burned but not clinkered.

4. The method of preparing shale rock for use as an aggregate which consists in burning the rock, crushing it and treating the crushed and burned material to eliminate the pulverized particles.

5. Concrete comprising as an ingredient naturally decomposed shale rock which has been burned but not clinkered.

6. A concrete comprising portland cement and an aggregate consisting entirely of finely crushed burned shale rock and coarsely crushed burned shale rock.

10. The method of making concrete which consists in burning shale rock, crushing the burnt material into fine and coarse pieces and mixing of said fine and coarse pieces, with a binding material and water.

11. A concrete comprising a binding material and an aggregate consisting entirely of finely crushed burned shale rock and coarsely crushed burned shale rock.

The purposes of the invention, as stated in the application, are:

"My invention relates to a new material having a very large variety of uses. In its chief use it may be classified as a building and construction material. Another important use is as a refining or purifying material.

"An object of the invention is to provide a relatively light chemically inert, porous material useful in the refining of sugar or oil.

"Another object of the invention is to provide a light, inert material highly resistant to stresses to take the place of the usual sand and crushed rock in concrete.

"Another object of the invention is to provide a concrete having a high elastic limit or coefficient of elasticity, and a high ultimate compressive strength.

"The invention possesses other features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of my invention."

The disclosure of the specifications respecting the treatment of the shale is:

"In the practice of my invention I take shale rock which has preferably been decomposed by the action of the elements and burn it in a kiln or otherwise subject it to a temperature of 2000 deg. F. or above for a period determined by the nature of the rock, so that all organic matter therein is destroyed and it is reduced to a light porous, hard material. . . .

"After burning the shale, the resultant pieces are crushed and graded. The very fine material is a superior refining agent in the refining of sugar and oil, and for this purpose displaces the commonly used fuller's earth. The larger pieces of the material I substitute for crushed rock in the preparation of concrete, the finer particles being substituted for sand in the mixture."

The further description has reference to the mixture of this aggregate with other ingredients for making concrete, and extolling the virtues of concrete employing this aggregate instead of sand and rock.

The patentee died a very short time after the patent was granted, and the patent lay dormant for about six years, when it was assigned to appellant, which brought this action against appellees, who manufacture from shale rock an aggregate very similar, if not identical, in its properties to that of the alleged teaching of the Olsen patent.

Issue Involved—and Decision

The alleged dominating features of both products are the lightness of this aggregate over crushed rock and sand of the ordinary practice, with the resultant lightness of concrete made therefrom, as well as its fireproof and elastic qualities.

Appellees are licensees under a prior patent to Hayde, No. 1,255,878, February 12, 1918, application filed July 3, 1917, under which it is contended their product is made, and that if the Olsen patent be considered to cover appellees' product, the Hayde patent anticipates Olsen. It is further contended that regardless of the scope of this Hayde patent, the evidence shows Hayde, and not Olsen, to have been the earlier maker of such aggregate, and of concrete in which it is used, and by substantially the same process as Olsen's. The earlier Hayde application would, upon its face, give Hayde priority if the patents were for the same thing. Hayde's patent purports to be for a "process of making brick and similar articles," and the specification is devoted to a description of the process.

In the Patent Office this Hayde patent, earlier than Olsen in application and grant, was cited against Olsen; whereupon Olsen amended certain of his claims to emphasize that the burning of his process did not produce the product of "hard dense particles and clinkers," as stated in the Hayde specification, and in his claims 1, 3 and 5 Olsen substituted the words "burned but not clinkered," and in claim 2 "burning without clinkering"; and as thus amended his claims were allowed.

When Hayde sought a re-issue, and undertook to make claims for an expanded cellular aggregate, such claims were denied him on the ground that he had not originally described any such article.

But it is contended that before the Olsen invention Hayde had reduced to practice a process substantially like that of the Olsen patent, and had made a concrete aggregate and a concrete substantially like that described and claimed in Olsen's patent.

Olsen and Hayde had been long acquainted and had had some business relations. Both had been working in the art of making concrete. As far back as October, 1905, Hayde had secured patent No. 803,285, for "fire and waterproofing composition," of which coarse and powdered burned clay were constituent parts of a concrete product. It seems that some time afterward Olsen proposed getting a license under this patent, for the making of telephone poles and the like.

The evidence justifies the conclusion that for several years prior to the application for his first above patent Hayde was actively experimenting for the production of a light-weight aggregate as a constituent of molded brick and other concrete articles. In the early stages of the World War there was discussion and investigation respecting the feasibility of employing concrete in building ships and barges, and it was evident that a light-weight concrete, otherwise adaptable, might be of much value for such use. It was abundantly shown that at least as far back as early 1917 Hayde had submitted samples of various such products from burned shale to laboratories for testing, and that the tests showed the aggregate, as well as the concrete made from it, to be expanded and porous and about 30% lighter than concrete aggregates ordinarily were.

The commercial aggregate put out by the Hayde interests was called "Haydite," and while it was asserted to be made under Hayde patent No. 1,255,878, it was put out under the claim that it possessed, inter alia, the virtue of lightness. Early in 1918 it was submitted to the Bureau of Standards at Washington, and in some of the reports of the bureau of about that time it was stated that "Haydite" was one of the products submitted for "tests of various aggregates to produce a light strong concrete." In a bureau sheet of May, 1918, it was said:

"In order to produce a concrete that weighed considerably less than concrete as ordinarily made tests have been made of a large variety of aggregates, including . . . Haydite, a shale or clay clinker."

Various other of the bureau reports showed Haydite to be much lighter than ordinary concrete aggregates and products.

On this subject the district court said:

"The evidence shows that Stephen J. Hayde in 1915 had a burned, light weight, expanded material which he sent from California to his nephew, George Hayde, in Kansas City. The letter to his nephew concerning the material directs special attention to the light weight characteristic of the burned material. The evidence further shows that from March to September, 1917, Hayde submitted samples of burned aggregate to the Kansas City laboratory for testing. Four of the 19 samples submitted were of such exceptional lightness that Mr. Cross, the chemist in charge of the laboratory, noted the fact on the test sheet, though he says Mr. Hayde did not seem particularly interested in the fact and had requested no tests for weight. Dr. Cross, who is now a stockholder in the complainant's company, states, however, that there is no doubt but that Hayde 'had a light weight aggregate.' The foregoing evidence, together with the tests made on Hayde's material by the United States Shipping Board, the material introduced in evidence which was sent to Prof. Duff A. Abrams for testing in the laboratory at Lewis Institute during April and May, 1917, and the mass of evidence which may be taken as highly corroborative, to the effect that Hayde had been experimenting constantly for several years prior to 1918 to perfect a method of producing a satisfactory light weight aggregate, burned from clay and shale, often with excellent results, shows conclusively to my mind that Hayde had conceived and produced a light weight aggregate such as Olsen claims befor Olsen conceived or produced it."

Suit Over Olson Plastic Cement Patents

OWNERSHIP OF A PATENT forms the basis of assertion in a suit begun July 18 in Superior Judge Guerin's court, Los Angeles, Calif., where E. B. Wyman and E. G. Meiklejohn are suing the Monolith Portland Cement Co. Hans M. Olson, discoverer of the process for making an improved form of plastic cement, also is named as a defendant.

The plaintiffs assert sole rights to manufacture, under an agreement with Olson made July 15, 1920, and further assert that the defendants made cement without paying them 5 cents a barrel royalty. The defendants reply that the plaintiffs failed to establish a plant as stipulated in the agreement with Olson and that the patent right automatically reverted to the discoverer.—*Los Angeles* (Calif.) *Times.*

Fair Buildings Rise

THE CHICAGO World's Fair for 1933 is assuming concrete form. Ground was broken the other day for the Travel and Transport Building, in area 145 ft. wide and 1000 ft. long, without windows and with dome suspended from so-called "sky hooks." Steel work for the Administration Building is going up and the World's Fair staff expects to move into permanent quarters in the fall.

New Idaho Limestone Operation Ready to Ship

WITHIN 40 days the Sewell Lime Co. expects to be shipping lime rock to paper pulp mills of the Northwest, according to information given out by Walter Sewell of Orofino, Idaho, a stockholder and discoverer of the lime deposit better known here as Lime Mountain. While fishing one day along Orofino creek, following construction of the new logging railroad to Headquarters, Mr. Sewell discovered some float and, following up, he uncovered the vast deposit of lime since named as above. Chrysotile asbestos, zonolite and several other minerals were also discovered near the site, but it is not known as yet to what extent these exist.

Lime Mountain is situated 11 miles from Orofino along the Headquarters railroad, the base of the lime deposit being within 7 ft. of the right-of-way. The mountain of lime is 600 ft. wide, 1100 ft. high and extends from one side of the hill over the top and down the opposite side. A massive ledge of solid lime has been followed this distance and is presumed to be solid clear through at the base. However, should this prove untrue, there is lime rock enough on the near surface of the mountain to permit operations for a great number of years.

Recent assays submitted by the company to Walter Keith, of Seattle, showed that the rock is from 98.12% to 99.55% calcium carbonate.

Mr. Sewell interested a number of his friends in the deposit and a corporation was organized which has Dr. H. D. Britan, Orofino, as its president and treasurer; E. U. Falen, Orofino, vice-president; Joseph M. Molloy, Orofino, secretary, and Theodore Blake, Orofino, assistant secretary. The corporation is known as the Sewell Lime Co.

E. A. White, Lewiston, of White Brothers and Crumm, commission men of Lewiston, examined the deposit. He has been connected with several lime companies in this region during the past five years and has spent considerable time examining deposits and studying methods of production and uses of lime. He was highly enthusiastic about Lime Mountain and informed the *Tribune* that the quality of the stone here was of high grade and uniform; that it has very little foreign matter and no evident signs of iron or magnesia; very little dirt or waste material to be moved to get at the deposit, and is located in a natural cove for the dumping of whatever waste there is. He was impressed by the fact that the deposit is so situated that most of it can be taken out by gravitation.

J. M. Molloy, secretary of the company, stated that 207 major industries in the United States must use lime and lime rock in the manufacture of their products and that the high-grade lime deposits of the East are gradually working out, while the demand for this grade of lime is gradually increasing. Some of the biggest users are paper companies, cement companies, fruit growers and builders.

Excavation has already been started at the deposit for the installation of kilns, which are to be installed as soon as other development work has reached such a stage for this to be possible.—*Orofino* (Idaho) *Tribune.*

Recent Contract Prices

GREEN BAY, WIS.—The Wisconsin State Highway commission, District No. 3 has decided to reject bids on section A of the gravel base project on State Trunk highway 78 from Institute to Sister Bay, and will award the contract for that section to the Green Bay Materials Co. of Sturgeon Bay, low bidders under option of D. I., after making adjustments on quantities of materials. This section starts at the south end of the job and extends north for a distance of 7½ miles. The adjustment under D. I. will be approximately 13,000 to 15,000 cu. yd. It will be somewhere within the unit of $1.45 for coarse material, $1.25 for fine material, and the company will be awarded the contract under these conditions.

The contract for section B of the same road will be awarded to Henry Boulanger, low bidder, with an adjustment in material quantities at a unit price bid of $1 per cu. yd. for base coarse material on the road, $0.60 per cu. yd. for fine materials in stock pile and $0.40 per cu. yd. for hauling fine material from stock pile to the road. There is approximately 32,000 cu. yd. of base coarse material on option B, a distance of 9.3 miles.

Option C, a distance of 4.6 miles, will be awarded to Pannen and Janssen, of De Pere, on a contract basis of low unit prices of $0.91 per cu. yd. for base coarse material on the road, and $0.76 per cu. yd. for fine material. The quantities involved are approximately 12,000 cu. yd.

D. F. Culbertson, division engineer of the state highway commission, returned recently from Madison where he discussed the Door county road proposition with the state highway commission. He also made an inspection of the construction work being done in the vicinity.—*Green Bay* (Wis.) *Press-Gazette.*

Boulder Dam Will Require 5,000,000 Bbl. of Cement

DR. ELWOOD MEAD, director of the United States Reclamation Bureau, who is directing the work of the proposed Boulder Dam to be built on the Colorado river in the vicinity of Las Vegas, Nev., has his office in Denver, Colo., at present. In conference with President Carl R. Gray and Vice-President E. E. Adams of the Union Pacific railroad relative to the building of a railroad from Las Vegas to the dam site it was stated that one item alone to be transported was 5,000,000 bbl. of cement.

Iowa Quarry Operator Said to Be Planning to Move

THE *North Iowa Times* is informed that E. C. Schroeder and Co., who operate the Marquette Stone Co.'s quarry in West Marquette, Ia., are making plans to move their machinery and equipment from the present quarry site to a location along the Mississippi river.

Advices from Congressman Haugen and the War Department indicate that there will be considerable improvement of the upper Mississippi river during the next ten years. In these improvements the government will require large quantities of rip-rap stone and crushed rock, and E. C. Schroeder and Co. want to be in position to furnish a considerable portion of this material.

They have prospected several locations above and below McGregor, Iowa, on the river, and where proper side tracks can be located on the railroad for the production of stone for concrete highways and surfacing.

The present location of their quarry does not fit into this picture, officials declare, as the high cost of overhead expenses such as royalties, power, etc., make the production of rip-rap and crushed stone prohibitive from the standpoint of a large production in these days of keen competition, and the only way that any quarry can operate now is upon a large production basis, they add.

Washington (State) Asbestos and Talc Developments

MACHINERY AND EQUIPMENT to begin preparation of asbestos and talc for market have been bought and are ready to be installed by the Washington Asbestos and Talc Products Co., Burlington, Wash. It has been decided to move the offices of the company from Mount Vernon to Burlington.

Both moves are significant of the rapid progress of the new company. The mine and the factory both are located in Burlington. The purchase and installation of machinery indicates that income from the mine's products will soon be forthcoming.

At a meeting of trustees recently, C. E. Woollen was elected president, C. E. Goodwin, vice-president, and C. R. Buck, secretary-treasurer.

Mr. Woollen and Mr. Buck left for Seattle the next morning to buy the machines necessary for the manufacture of the more than 60 tons already taken out of the mine. The machinery is to be delivered immediately, at which time work will begin to place it in shape to begin operations.

Dr. W. L. Jackson, J. H. Crossley, C. E. Woollen and C. E. Goodwin were elected directors of the company by the stockholders.

The local asbestos deposit is the second in the United States to be developed, the other being milled in Arizona. Only 1% of all the asbestos used in the United States is produced in this country, according to Mr. Woollen.—*Burlington* (Wash.) *Journal.*

Loaded Great Lakes Crushed-Stone Carrier Sinks

THE CRUSHED-STONE carrier *George J. Whelan,* with a load of limestone from Kelley's Island, Ohio, to Tonawanda, N. Y., turned over and sank in Lake Erie off Dunkirk, N. Y., during the night of July 28, 1930, according to newspaper reports received.

The mishap is believed to be the result of high waves causing the boat to take water in its cargo and to list, turn over and later sink. Reports of six survivors picked up by the *Amasa Stone* of the Pickands-Mather fleet and brought into Erie, Penn., indicated that 15 of the crew, including the captain, were lost.

The boat was built in Toledo, Ohio, in 1910, and under the name of the *Irwin L. Fisher* was sunk as the result of a collision in the Detroit river on its first voyage. It was raised and during the war was taken to England, and following the war was returned and put into the stone carrying service under its present name.

New Gravel Plant Burns Before Having Produced Any Material

ONE of the most stubborn fires in this vicinity (Springfield, Ore.) and perhaps the hardest to handle entirely destroyed the new bunkers, some of the machinery and all of the electric wiring and switches for the recently organized Inter-City Sand and Gravel Co., about three-quarters of a mile west of this city recently.

The new plant had been almost completed and it had been expected to start filling the bunkers within a week. The plant consisted of eight bunkers, a rock crusher, and all other necessary machinery for a modern plant. Much of the machinery was melted and warped out of shape by the flames which seemed to start on the floor of one of the bunkers and then crawled up the sides, eating their way through the 12-in. floor and the 6-in. walls.

It is still a mystery how the fire could have started only twenty minutes after the carpenters had left the work, and in a very few minutes more make a blazing mass out of the large amount of very green lumber used in the construction.

The loss is estimated to be in the vicinity of $12,000 and was not covered by insurance.

"We did not even have construction insurance on it," declared K. R. Chase, one of the incorporators of the Inter-City Sand and Gravel Co. "Gravel bunkers are not considered a very great fire hazard even after they have been built, let alone before they had been completed when the wood is almost wet."

The incorporators of the new firm are Mr. Chase, Sig Moe, and Clarence Nelson. They have already started tearing down the charred remains of the original plant and have announced that they will begin work at once rebuilding the bunkers. Only the foundation and the posts holding the bunkers can be used again. It will take about 50 days to complete the work.

Just what effect the burning of the plant will have on the highway work in this vicinity has not been determined. The gravel company had built the new plant because they had contracts to furnish more gravel than they were able to supply from the plant at Springfield.

Fire calls were answered by trucks from both Springfield and Eugene. The Engene truck mired in the sand and was not used in fighting the fire. Hugh Joliff and assistants were successful in running a hose to the river and pumping water from that source.—*Springfield* (Ore.) *News.*

James H. Grove

AFTER an illness of about 10 days, James H. Grove, one of the best known residents of Frederick, Md., died at his residence, 107 West Second street, at 10 o'clock July 18 of cerebral hemorrhage. Mr. Grove had been in ill health for some time and was suddenly stricken on the evening of July 4 upon his return home after spending the day out of town with a party of friends. Following a stroke of paralysis he was reported in a critical condition, and death, although a shock to his relatives and friends, was not entirely unexpected. He was aged 61 years 7 months and 10 days.

The son of the late Manasses Jacob and Susan Jarboe Grove, Mr. Grove was born at Lime Kiln, Md., December 4, 1869, and was educated in the public schools and at Frederick College. During his boyhood he was associated with the M. J. Grove Lime Co., of which his father was founder, and later he became general manager of the Frederick plant and a director in the company, which offices he held at the time of his death.

In addition to his affiliations with the Grove Lime Co., Mr. Grove was a part owner of the Mountain City garage, was intensely interested in baseball, especially in the sport as played locally; was an adherent of the Democratic party, a member of Frederick Lodge, B.P.O.E.; Knights of Columbus, and of the Holy Name Society of St. John's Catholic church. On June 13, 1890, he was married to Miss Anna Forsythe, daughter of A. P. Forsythe, of Howard county.

Mr. Grove is survived by his widow, Mrs. Anna F. Grove; three sons, James H. Grove, Jr., William Jarboe Grove and M. J. Grove, all of Frederick; and the following brothers and sisters: William J. Grove, Lime Kiln; Edward D. Grove, Frederick; Mrs. John C. White, Kansas City, Mo., and Mrs. George C. Biser, Bedford, Penn.

Gravel Tow Boat on Tennessee River Burned

THE *Richland,* a tow boat used by the Caney Creek Sand and Gravel Co., to tow sand and rock from the dredges in the Tennessee River to Caney Creek was detroyed by fire recently as it was making a trip down the river. The blaze was caused by a backfire from the motor which set the refuse and waste located in the bottom of the boat on fire and before it could be extinguished the boat was in flames all over and burned to the water's edge. The damage to the outfit has not been estimated but is a considerable amount.

Representatives of the company went to Knoxville to purchase another boat to take the place of the one destroyed. This company furnished the sand and gravel for the construction of the Tennessee river bridge at South West Point.—*Rockwood* (Tenn.) *Times.*

New Cement Plant for Northwest Projected

A NEWS ITEM from a West Coast correspondent, dated Portland, Ore., July 29, states that the Wallowa Lime and Cement Co. has been organized to build a $3,000,000 cement mill at Wallowa in eastern Oregon. The incorporators are Lewis H. Mills, Walter J. Burns, I. L. Webster, A. S. Kerry, Dr. Eueidas K. Scott and R. Green. The projected mill will have a capacity of 3500 bbl. per day. It is also proposed to make 100,000 tons of lime a year.

Sand and Gravel Machinery Men to Meet in Chicago in September

THE ANNUAL MEETING of the Manufacturers' Division of the National Sand and Gravel Association will be held at the Stevens hotel in Chicago, Ill., the evening of September 18 and on the morning of the 19th. Plans will be considered in reference to the forthcoming exhibit at the annual convention of the National Sand and Gravel Association, to be held January 27-29, 1931, at St. Louis, Mo. M. B. Garber, the Thew Shovel Co., Lorain, Ohio, is chairman of the manufacturers' division of the association.

Chemical Firm Disposes of Phosphate Rock Holdings

THE AMERICAN Agricultural Chemical Co., New York City, is disposing of its large holdings of phosphate rock acreages wherever possible. This is in line with a policy adopted of divesting the business of activities which are unrelated to the fertilizer-chemical industry. Other unrelated real estate also will be sold. It is the intention of the management to become a fertilizer-chemical corporation only with major portion of its business in chemicals.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Northwest Concrete Products Association Meeting at Bellingham, Wash.

Olympia Is Chosen for the Midwinter Session Next January Following Fifth Midsummer Convention Held July 18 and 19

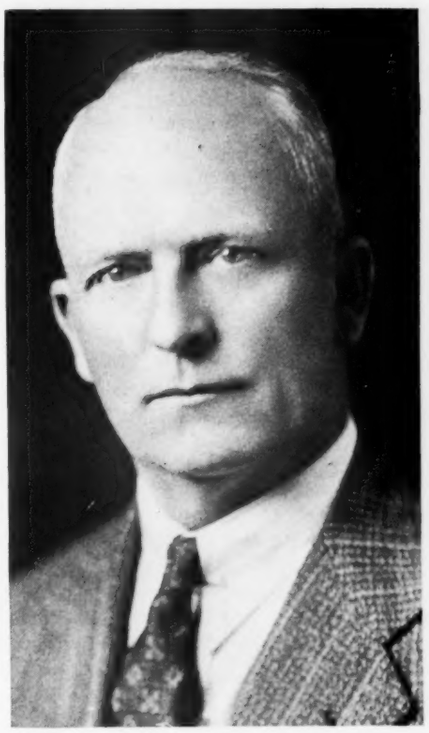
THE FIFTH midsummer meeting of the Northwest Concrete Products Association was held at the Leopold hotel, Bellingham, Wash., July 18 and 19, bringing together both for instruction and play a representative number of manufacturers of concrete products from some 60 plants located in Oregon, Washington and Idaho. A number of officials from various cement manufacturing concerns were on the program with timely talks and suggestions for the betterment of the industry.

The meeting was opened by President Hans Mumm, Jr., and after brief words of greeting, he called upon Carl B. Warren of the Spokane Concrete Pipe Co., who gave an address on "Sales Contacts" full of valuable suggestions gained from extensive experience in the broad Inland Empire, embracing some 10 counties in Washington and Idaho. Mr. Warren said he endeavored to make contacts every 30 days with county engineers, and that generally sales were in direct proportion to the number of successful contacts made. He also stated that competition had been eliminated in some cases by stressing the quality of concrete products, and the fact that all materials and labor were of home production. He also expressed gratification over Idaho's enlarged road construction program and predicted the demand for concrete culvert pipe would increase in that section.

Describes Ideal Plant

On account of the illness of Secretary W. P. Hews of Yakima, his address on "Laying of the Ideal Plant" was given by his partner, J. R. Sherman of the Yakima Cement Products Co., who illustrated the talk with a drawing of their outstanding plant at Yakima, constructed entirely of concrete and a monument to the business in the Pacific Northwest. The plant covers an area of 135x153 ft., containing modern machinery and every facility for economy and speed in production and built to accommodate a big increase in the manufacture of all kinds of concrete products in that section.

"Electrically Welded Mesh Reinforcements" was the subject of an instructive address by F. L. Martin of the Everett Concrete Products Co. He said that thus far the welding of the mesh had been found very satisfactory, using both the butt and arc welds. He also found it to be an advantage to weld the small cages at the plant, but said the larger ones had to be done by a boiler shop, and that butt welding was preferred. A number of samples have been sent to the Washington State Highway Commission for exhaustive tests. The 18-in. was welded at a cost of 25 cents a weld and the 24-in. at 30 cents, welding on the one side only, butt welds, with a portable outfit.



Hans Mumm, Jr., president, Northwest Concrete Products Association

W. W. Johnstone of the Olympia Concrete Products Co. described "Precast Concrete Cribbing," which his company is manufacturing successfully after designs submitted by the state highway department. He stated that the utmost precision was necessary in turning out concrete cribbing, and that the work if done at the plant instead of on the job was much more satisfactory. He gave his hearers detailed dimensions and methods for speedy, economical and efficient manufacture, stating that this made one more product for the manufacturer of concrete products and predicted increased demand for it.

E. B. (Ed) Ballinger of the Concrete Pipe Co., Seattle, submitted samples and gave an interesting address on "Odds and Ends in the Concrete Manufacturing Business," starting with stepping stones, in regular and odd shapes and designs, outlining the special forms used in their manufacture, and said they had made many new friends and steady customers and that volume continued good on these small items. Styles in highway posts are changing very rapidly and these also are bringing in a good volume of business, he said. Colors in small odds and ends are in demand. Another item being turned out in large quantities is rising blocks, 1½x3-in. and 4x4-in., used in various parts of buildings specified in bridge work. These are turned out by hundreds and thousands on special orders and resemble batches of cookies.

During the noon dinner Mayor John A. Kellogg of Bellingham welcomed the concrete producers, and W. F. Paddock of Seattle responded and, in turn, introduced Mayor Haley of Anacortes, a neighboring community. A description of plants and conditions in the middle west was given by Fred Strange of the Pt. Angeles Concrete Pipe Co. in the afternoon session. Some 14 plants were visited, including the Chicago Stone

Conduit Co., where Mr. Strange was impressed with the rigid inspection of conduits.

Describes Huge Conduit Project

An outstanding address of the first day's session was that of Frank Crook, resident engineer of Seattle, who gave a detailed description of the Lake Young water supply line, illustrated by motion pictures, showing three miles of 9-ft. concrete pipe in the 12-mile water conduit. The speaker showed how all material for the construction of this job was hauled some five miles and all sections completed on the ground, some of it under most adverse weather conditions between November and April when the thermometer was 5 and 20 deg. above zero. The work was accomplished most satisfactorily without the loss of a day. Competition was keen among the tampers, who took an unusual interest in their work. Each section bears the initials of the workman. Steam was kept up in the boilers continuously during the cold weather, insuring plenty of hot water at 160 to 180 deg. Mr. Cook said he found that on this job, as on others, higher priced labor was cheapest, especially in building for permanency, and that credit for this outstanding job should go to good contractors. The cost was $350,000 for the entire project and the pipe carries 100,000,000 gal. each 24 hours.

The attention of the concrete producers was called to "Credits" by Conrad Barker of the Morse Hardware Co., Bellingham, who stated that modern business needs credit, and that it enters into all supply business, and that without it business today would be handicapped. He cautioned his hearers against improperly granted credits and showed how some $817,000,000 had been piled up in losses through insolvencies, etc., and compared it to fire losses. He advised concrete manufacturers to read up and become familiar with lien laws and suggested setting an early time for placing a lien, for example, five days after delivery of materials, and to adhere strictly to this. He urged a study of rights under the lien law for protection. Bonds, he said, had been found very unsatisfactory and he suggested that an attorney be engaged to cover each job thoroughly.

Gordon Tongue, sales manager for Superior Portland Cement, Inc., gave some interesting "Results from Advertising" in various lines of business, and commented on the fact that up to the present time manufacturers of concrete products have not used advertising in the sale of their products as much as they should. He gave as his belief this angle of the business should be stressed to bring to the attention of the buyer the durability, economy and efficiency of concrete products, and thus build up confidence in concrete products. While advertising did not sell the products, it opened wide the way for the sale, and advertising is always the best possible investment, he said, giving in this connection a brief outline of the five-year advertising program of the Portland Cement Association.

G. A. Dunkle, American Concrete Pipe Co., outlined methods of manufacturing centrifugally cast pipe at his company's plant in Tacoma, and described various jobs in that section where American pipe now is in service, including several lines in the city of Tacoma, the Sultan river project and in the city of Kent. The American company had, for some time, been bothered with pipe sticking to the forms. Numerous preparations had been tried without success until recently, as Mr. Dunkle explained, a Calol cement oil made by the Standard Oil Co. was tried and proved most satisfactory. Mr. Dunkle also explained that in casting this centrifugal pipe his company had trouble with reinforcing material slipping and that they now are using with considerable success a new method patented by Mr. Clark of the British Columbia Concrete Pipe Co. The speeds during pouring are varied with the type of pipe, materials used and the weather, he said.

C. M. Howard, special representative for the concrete pipe manufacturers, divided his instructive paper into the grading of materials for making concrete pipe, flow capacities of pipe and culvert investigations and gave a number of quotations from special studies on these subjects prepared by the University of Iowa and University of Washington.

Reveals Unjust Discrimination

"Concrete Building Units" was the subject of a paper by Ward Kief of the Portland Cement Association in which he told of the investigations and remedies found for lower fire insurance rates as applied to concrete masonry. He showed how changes had been made in specifications so that concrete should have a certificate of inspection, whereas clay and other competitive products were allowed to be installed on jobs without any inspections. Mr. Kief pointed out that while concrete products have shown some increase in production, it was a certainty that brick manufacturers would make a strenuous effort to catch up, and that concrete manufacturers should advertise and watch the growth of competitive materials. He urged that contractors and architects be contacted regularly and that manufacturers at all times be able to back up their advertised quality products. In closing he urged representatives to watch building codes, which are often revised without notice and which may rule out concrete products.

Bailey Tremper, engineer of tests for the Washington state highway department, gave a brief report of recent welding tests, which had been found uniformly good. He showed that while there had been no failures, the wires had broken near the weld when placed under excessive weights, indicating that some chemical reaction had set in. He stressed the point of the careful placing of steel prior to pouring of concrete, which led to some discussion by the various members. Mr. Tremper said his department was always ready to co-operate and make all tests and report promptly.

"Sales Promotion" was the subject of a timely address by Darwin Meisnest, sales manager, Pacific Coast Cement Co.

Chairman Sharp of the convention committee suggested that the midwinter session of the association be held in Olympia, Wash., and on motion this city was chosen for the January meeting. Chairman Warren of the reorganization committee advised that after considerable discussion on the advancement of the association, they had no recommendations to offer at the present time.

After luncheon, with the business part of the program attended to most satisfactorily, the bulk of the visitors formed a caravan bound for the famous Mt. Baker Lodge, where a wonderful time was enjoyed by members and their families in golfing, swimming and dancing, completing an excellent midsummer session.

Knoxville, Tenn., Ready-Mixed Plant Advertises Product

THE FOLLOWING is a "story" in the *Knoxville* (Tenn.) *Journal* recently. It is reproduced entire not because it contains anything new to the industry but as *an illustration* of the kind of popular publicity that, in our opinion, is extremely helpful, not merely to the ready-mixed concrete producer, but to the commercial aggregate producer as well. Because this kind of publicity helps to carry to the average man the idea that concrete really is a manufactured product. The story, on a 2-column head, is as follows:

The Ready Mixed Concrete Co., located at Quincy avenue and Davannah street, has recently completed extensive additions to its plant, involving an expenditure of $20,000.

The construction of the plant representing a total investment of $100,000, was begun last spring and completed in July, when actual operation started. This company operates the only plant in eastern Tennessee manufacturing central mixed concrete for the building trade and, with the completion of the recent additions, possesses one of the most modern and complete units of its kind in the United States.

In this plant all materials except water are proportioned by weight. The water is automatically measured to the fraction of a gallon, an item of considerable importance in the control of the strength of concrete.

Some features of the plant include:

A daily capacity of 500 cu. yd of concrete.

A completely equipped laboratory for the testing and grading of materials.

Agitator body trucks of 3 cu. yd. capacity for delivering the concrete. These trucks are fitted with revolving steel agitators that

continually pass through the mixed concrete from the moment it is discharged into the truck from the mixer at the plant until it is delivered to the job, positively preventing any setting of the concrete or separation of the materials of which it is composed. This agitation can be maintained for a period of about three hours without any loss of strength. The trucks are of high lift type, discharging the concrete up to a height of 8 ft.

A heating plant which insures the delivery of heated concrete in the coldest weather. Regardless of atmospheric conditions this heating plant makes it possible to deliver concrete of a temperature that permits safe handling at the job without danger of freezing.

Central mixed concrete is, comparatively, a new idea in the construction, an improvement in concrete making that has received such a welcome from the contractors and concrete designers of this country that the number of such plants has increased from the 8 in existence 2 years ago to about 200 today, representing an investment of many millions of dollars.

This growth is the result of the exhaustive research work that has been conducted during the past few years by the cement industry and the leading universities and technical societies of the United States in an endeavor to bring the manufacture of concrete to the standardized plane upon which the making of other commodities used in the construction industry have been based for many years, particularly that of steel—and of cement, the basic ingredient of all concrete.

As we all know, the manufacture of steel is conducted under standardized specifications, formulae and processes so nearly alike that the outputs of the various mills are all rated the same in strength. The same is true of cement. But concrete, the companion of steel in nearly all construction undertakings, used with steel in all reinforced concrete work and fast replacing steel as the principal structural material used in most classes of building art, has, until the inception of the Central Mixing Plant, been mixed under conditions that seldom offer the opportunity to carry out the letter of the specifications under which the concrete is made, resulting in strengths that vary within a wide range of the strengths for which the concrete is designed.

This results, in a large percentage of cases, in an unbalanced strength of the individual structural members. The steel supplying the tensile strength of the member is reasonably certain to possess the strength factor by which its size is calculated. On the other hand, the concrete, supplying the compressive strength of the same member, is made under conditions so widely at variance that the result is quite often a member that is capable of resisting only a portion of the load that it has been designed to resist. This defeats the purpose of the design, which provides for steel and concrete of equal strength in the member, and causes not only a waste of steel, but a weakening of the structure that in many cases results in failure.

It is this condition of uncertainty in the mixing of concrete on the job that has brought about the advent of the Central Mixing Plant, welcome, alike, to the contractor, who is responsible for the safety of the structures that he builds, and to the architect or engineer, whose reputation rests upon the faithful execution of his specifications and designs.

The comparatively recent research and experimental work has resulted in discoveries from which have evolved valuable formulae and processes for the making of concrete of predetermined strength. One discovery of importance is the effect that the amount of mixing water has upon the strength of concrete, from which has come what is known as the Water-Cement Ratio. It has been found that the addition of water to cement increases the strength up to a fixed limit, beyond which the further addition of water causes a rapid decrease in the strength of the concrete. So serious is this loss of strength beyond a certain fixed ratio that the addition of 37½% more water will result in a loss of 45% of the strength of the concrete, or, inversely, by using 20% less water the strength of the concrete is increased 50%.

From these discoveries has come Design Mix Concrete, that is, concrete that is designed to resist a certain compressive stress for each square inch of surface after it has reached a certain age under certain conditions of curing.

All this has awakened renewed interest in concrete mixing on the part of structural designers the world over, and out of it has come the comparatively recent tendency of a large part of the designers to abandon the time-worn method of specifying concrete of stated proportions, a method that is certain, sooner or later, to give way almost entirely, at least on work of importance, to the more efficient method of designing for strength.

Mixing concrete by proportions on the job nearly always results in the use of excessive water to give the concrete workability (and, in fact, in many cases where the inspection is none too rigid, to give it extreme flowability) resulting in a loss of strength; while specifying strength concrete of a stated water cement ratio fixes both the strength and the proportions of sand, gravel and cement, since the contractor will decide, before he bids, on the amount of water he must use to give the concrete the desired consistency or workability, and this amount of water fixes the amount of cement that must be used in the mix to secure the strength desired. Thus the specify of design mix is equal to a guarantee that the concrete members of a structure will possess the strength for which they were designed.

However, in mixing concrete in the field, local conditions have always made it difficult, if not economically impossible, to satisfactorily conduct the work of examining, grading and testing materials for quality, cleanliness and moisture content and of accurately measuring and batching the materials, testing the finished concrete and doing other work necessary to insure that the complete structure will have the strength for which it has been designed.

This, primarily, is the reason for the fast growing popularity of the central mixing plant among both builders and designers. Architects and engineers are coming more and more to demand that the concrete that goes into the structures they design meet the requirements of their specifications, and contractors, alive to the economic advantage of centralized control of the conditions and operations that are essential to the fulfilling of those requirements, are turning more and more to the central mixing plant as a solution of the problem.

Some of the most important buildings erected in Knoxville the past season used ready mixed concrete throughout, notably the Medical Arts Building, Chevrolet Building, First Christian Church, Bethel Community Synagogue and the Shiloh Negro Church. Several hundred other contracts have been filled.

The officers of the company are: President, John L. Humbard; secretary and treasurer, Joseph B. Davis; directors, Joseph G. Humbard, Ben P. Humbard, T. L. Peters and Herbert Kidd.

We dare say that the above article was as much read as any in that issue of the paper, because the average man is interested in concrete, from seeing it made often, and the average man loves to acquire a smattering of technical knowledge on any subject that interests him. Of course it is not known whether the article was published for its news value or for some other consideration, but any newspaper editor could afford to publish such articles now and then for their reader interest—it seems to us.

J. R. Sensibar's Start in the Sand Business

TWENTY-FOUR YEARS ago J. R. Sensibar, president of the Construction Materials Corp., Chicago, Ill., started in business with $100 as capital. Today his company is worth close to $8,000,000. He is one of the first men to make a scientific study of the builders' supply business.

In his twenty-odd years in the business Mr. Sensibar has moved sand by shovel, wheelbarrow, scraper, horse and wagon, railway car, motor truck, steam shovel, locomotive crane, belt conveyor, boat, electric and Diesel-driven pump. He says the sand and gravel business of today is the same today as it was thousands of years ago; that the change has only been in the methods of moving it.

"Right now," he explains, "Chicago is getting ready to build out in the waters of Lake Michigan just off the Chicago shore the solid land on which will be erected the architectural marvels of the Chicago Century of Progress exhibit of 1933. The job, in all probability, will be done by pumping in several million tons of sand brought by boat from all points along the lake shore."

Before Mr. Sensibar went into the present company his father set him up in business as a teamster and manager of teams. He helped to haul away, yard by yard, the mound of sand that covered what is now the site of Gary, Ind. One night a fire burned up the horses, tools, tents and everything else. There was no insurance. It was a real calamity, but as he states, it forced the infant sand business out of the horse-and-wagon stage for all time.

In order not to disappoint customers in Chicago who were depending upon him and his father for sand, they opened up a pit along a railroad track, where men with shovels and wheelbarrows could load cars.

Two good strong men, if they worked hard, could load three 40-ton cars in an 11-hour day. They were paid $3.60 per car—good wages for those days. But after a while, when even such high wages failed to entice men to do the punishing physical labor, the steam shovel was adopted.—*Chicago* (Ill.) *Post.*

Marquette Cement to Enlarge Memphis Packing Plant

MORE than $200,000 will be spent in Memphis by the Marquette Cement Manufacturing Co. to enlarge its present storage and packing plant at Poplar avenue and the river front, it is announced.

Contracts will be let in a few days for construction of two concrete silos that will cost more than $100,000.

Another improvement is a modern concrete mixing plant to provide the building trade with both wet and dry batch mixed cement. This improvement will cost another $100,000.

In connection with the two silos, there will be new and larger overhead transformers erected, and a small building to house the transformers.

Completion of these two silos will give the cement company double its present capacity for handling cement here and bring its total investment up to $600,000, providing a storage capacity for cement of 250,000 bbl. annually.

About a year ago the company decided to bring cement to Memphis by barges on the Mississippi river from Cape Girardeau. Cement now is shipped here in bulk, packed at the local plant and supplied to the trade of the city, western Tennessee, Arkansas, Missouri, Illinois and Kentucky.—*Memphis* (Tenn.) *Evening Appeal.*

Wabash Portland Cement Doubles Capacity of Osborn Mill

THE EXPANSION PROGRAM that has been under way at the Osborn, Ohio, mill of the Wabash Portland Cement Co. and the construction work that the program called for is almost completed. Different construction companies that have been busily engaged in the work of enlarging the Wabash plant to a size that makes it now one of the foremost cement plants in the country are finishing up their work and are leaving for work on contracts elsewhere.

The construction work and the increase in equipment of the Wabash plant has been going on since last September. The new equipment recently installed makes the local plant twice as large as it formerly was. It now has a capacity of from 5,000 to 6,000 bbl. a day.

Two Compeb mills have been added to the two already in use, making a total of four Compeb mills that will be in operation. The new Compeb mills are larger than the two that have been used since the plant was built.

A new coal-grinding mill has also been added. This mill is a combined dryer and grinder. It has a capacity of from 12 to 15 tons per hour.

In addition, two new kilns, making four in all, have been erected. The new kilns are also larger than the two original ones.

In the power house, two waste-heat boilers have been added and a new turbine installed that has twice the capacity of the other two turbines combined.

Two new loading railroad tracks have been laid by the company to make provisions for the extra shipping that the new equipment will make possible. An arangement has been made with the C. & L. E. traction line and the Erie railroad whereby the Erie engines switch the traction cars from the traction sidings south of Fairfield to the Wabash plant north of Osborn. This switching of cars is said to save the Wabash the trouble of handling the cement twice whenever they use the C. & L. E. cars to ship the product away.

The additional equipment necessitated the erection of a new stack. The new stack has been finished for some time, but last week was the first time that smoke was seen coming from the mouth of it, it is said. The finished stack is almost a twin to the first one built, measuring 180 ft. from the foundation to the top.

L. E. Palmer is works manager of the Wabash plants in Osborn and Stroh, Ind.—*Osborn* (Ohio) *Herald.*

Universal Atlas Cement Appointments

C. A. WEBB has been appointed district sales manager in charge of the city of Chicago district for the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp., according to an announcement by F. L. Stone, general sales manager. He succeeds W. L. Greenly, district sales manager, who has been transferred to the general sales office.

Mr. Webb has been with the Universal Atlas company 13 years, including a leave of absence at the time of the World War when he served in France as an officer in the American army. For more than two years he was technical service engineer for the company and for about eight years has been in its sales department.

Mr. Webb is a graduate civil engineer from the University of Arkansas and also has a master's degree in engineering from Columbia university. Prior to his connection with the Universal Atlas company he was with the Chicago, Milwaukee and St. Paul railroad, engaged in valuation work. He later was in the employ of the American Tar Co., Boston, in charge of highway construction and maintenance. He also was connected with the Kansas City Terminal Railway Co. and helped to design the double-tracked railroad structure in the union station of that city.

He is a member of the Western Society of Engineers and of the Builders' Club and an associate member of the American Society of Civil Engineers.

Tulsa, Okla., Cement Plant Site Selected by Officials of Missouri Portland

OFFICIALS of the Missouri Portland Cement Co. have chosen an 83-acre tract one-fourth of a mile north of the McIntyre airport as a site for the $2,500,000 cement plant proposed for Tulsa.

This information was made public through P. C. Blaise, general superintendent of the company, on a visit to Tulsa.

The site is served by the Howard spur of the Frisco railroad and an established rail connection already exists between the plant site and a 320-acre tract 10 miles east of Tulsa, chosen for the quarry. Extensive limestone deposits are available at the quarry site and shale turned up in connection with surface mining for coal is available in the vicinity of the plant site.

Fifty-three acres of the land selected for the plant was purchased from the Tulsa Industrial Development Co. Other tracts to complete the 83 acres upon which the plant will be located were bought from William Lynch, M. A. Younkman and A. H. Matthews. The deeds were to be recorded this week.

Nine months is estimated as the minimum time required for completion of the plant. Work will start in two months. Company officials think that the plant will be in operation by June 1, 1931.—*Tulsa* (Okla.) *Tribune.*

Universal Atlas Cement Eliminates 12-Hour Day

A FINAL ELIMINATION of the 12-hour working day, involving shorter hours for men on that schedule and giving employment to others, has been worked out in the plants of the Universal Atlas Cement Co., according to B. F. Affleck, president of the company.

Mills which were owned by the former Atlas company came under United States Steel Corp. rules through the purchase of the Atlas Portland Cement Co.'s properties and business in January and their consolidation with the Universal Portland Cement Co., a Steel corporation subsidiary. One of these rules is that no man may work more than 10 hours per day or more than six consecutive days.

Formerly some of the men employed in the Waco, Tex., and Leeds, Ala., mills worked more than 10 hours, many of them 12 hours per day. Substitution of three instead of two shifts per day was completed on July 15, Mr. Affleck announced.

Institution of the eight-hour basis placed all of the company's mills on the same working hour basis. In addition to the plants at Waco and Leeds, other plants are operated by the company at Hudson, N. Y., Northampton, Penn., Universal, Penn., Buffington, Ind., Duluth, Minn., Hannibal, Mo., and Independence, Kan.

Some Details of the South Carolina Cement Contracts

CONTRACTS for the purchase of approximately 2,750,000 bbl. of cement for its $61,000,000 road building program as authorized by the state highway department at its meeting on June 26, were announced recently.

In each case the department reports the usual cash and dealer's discount. The fact that the majority of the contracts have named the Charleston port price for relatively large proportions of the projects was pointed out as an additional advantage. The Charleston price, according to the highway department's information, was fixed with a view to meeting foreign competition, and accounts for the wide differences between this price and prices prevailing in the western part of the state.

Highway officials estimate that the average net cost to the department of cement delivered at various points over the state will be between $2.35 and $2.40 per bbl., depending on quantities actually delivered at the different points.

The contracts follow:

With the Carolina Portland Cement Co., 500,000 bbl. to be delivered up to December 31, 1931, with an option for 500,000 additional barrels to be delivered in 1932. The net price fixed in this contract is $2.40 per bbl., f.o.b. Columbia, with freight adjustments in case of delivery at other points. The point of origin named in the contract is Knoxville, Tenn., this contract based on the low bid submitted May 15, 1930.

(2) With the Lehigh Portland Cement Co. of Birmingham, Ala.. 225,000 to 300,000 bbl. for use on projects in Orangeburg, Calhoun, Spartanburg and Abbeville counties. This contract provides for a net price of $2.05 per bbl. based on Charleston delivery for the Orangeburg and Calhoun county projects—the quantity of cement estimated for these projects being 105,000 bbl. The price to be paid for the cement delivered in Spartanburg county is $2.58 per bbl., while in Abbeville county the price ranges from $2.53 to $2.62 per bbl., depending on whether the cement is delivered at Abbeville, Donalds or Due West.

(3) With the National Cement Co. of Birmingham, Ala., 350,000 bbl., delivered up to June 30, 1931. This contract is accompanied by a long list of quoted prices at various points over the state and carries a provision that the cement company will meet any better price or purchase conditions that the department may be able to obtain from competitors. In case of failure on the part of the company to do this the contract may be cancelled by the department. There is also a collateral contract between the National Cement Co. and the highway department providing for payment by the company to the department of $45,500 in settlement of the department's claim against the company on account of the failure of the Travelers Rest road in Greenville county, which failure was attributed by the department to the quality of the cement furnished by the company.

(4) With the Lone Star Cement Co. of Birmingham, Ala., for furnishing from 300,000 to 500,000 bbl. of cement up to December 31, 1931. This contract is similar in form and price structure to the contract of the Lehigh Portland Cement Co., except that the projects listed are provisional and provisions are made for substitutions at the department's option upon the condition that the average net rate of compensation to the company shall not be reduced as a result of any such substitutions.

(5) With the Pennsylvania-Dixie Cement Corp., of Chattanooga, Tenn. This contract provides for furnishing from 300,000 to 600,000 bbl. up to December 31, 1931, and is otherwise similar in respects to the contract of the Lone Star Cement Co.

(6) With the Signal Mountain Portland Cement Co., of Chattanooga, Tenn. This contract provides for furnishing from 250,000 to 500,000 bbl. up to December 31, 1931, and is otherwise similar to the contract of the Lone Star Cement Co.—*Gaffney* (S. C.) *Ledger.*

Universal Atlas Cement May Build Toledo Packing Plant

THE Universal-Atlas Cement Co., a subsidiary of the United States Steel Corp., may build one of eight branch storage and marine loading plants in Toledo, Ohio.

It is understood a Toledo real estate man has been asked to give appraisal on a 20-acre site in the up-river district on which the proposed branch plant would be erected. It would be similar to that of the Huron Portland Cement Co. plant recently completed on the river below the Cherry street bridge.—*Toledo* (Ohio) *Blade.*

Peter Martin

PETER MARTIN, well known lime manufacturer of the Indiana and Ohio district, died recently at the age of 75 at his home in Huntington, Ind.

Mr. Martin was born in Germany and came to the United States when 17 years old. He first engaged in his trade as a stone cutter, but soon became interested in the manufacture of lime, in which he continued for about 50 years. Starting in a small way he added more plants, later bringing a number together under the name of the Ohio and Western Lime Co., which was subsequently absorbed by the Kelley Island Lime and Transport Co. He was prominent in the first National Lime Manufacturers Association. He is survived by a widow, a daughter and three sons, all of Huntington.

South Carolina Highway Commissioner Still Trying to Promote Cement Plant

PROSPECTS today for a cement manufacturing plant of considerable size for South Carolina are brighter than ever before, C. E. Jones, the highway commission chairman, who has been attempting to bring a plant to this state, declared recently.

The plant, Mr. Jones said, would be of such proportions that its output would be available for the commercial market as well as for the state's road construction program.

The state has already contracted for more than $5,000,000 worth of cement for this year's and 1931's paving. These contracts, however, do not in the least, Mr. Jones said, interfere with the proposed South Carolina cement plant, but will rather, he believes, act as incentives for a plant near the wholesale highway projects.

"I am positive that a plant will be located in South Carolina in the near future. I can assure the public that the plant is more of a possibility and probability today than ever before. I am confident that it will be built, and built soon."

A large cement manufacturing plant in this state will be able to furnish the highway department cement cheaper on account of the shorter haul than out-of-state competitors, Mr. Jones points out. Additional benefits will arise, he is confident, in the employment situation and industrially.—*Columbia* (S. C.) *State.*

South Carolina Dealers Don't Like State's Cement Bargain

GEORGE C. CUNNINGHAM, head of a lumber concern of Columbia, S. C., returned to his office from Charleston, where he attended the meeting of the Carolinas Retail Lumber and Building Dealers Association, by which dissatisfaction was expressed over the procedure of cement manufacturers in selling cement for road building purposes to the state of South Carolina direct instead of through dealers.

Mr. Cunningham was appointed on a committee with J. C. Kendall, Florence, and H. J. Munnerly, Bennettsville, to make a personal investigation about the matter, then meet together to report their findings. In about two weeks they will report to directors of the associaion.

"We have reason to believe that the cement manufacturers sold cement to the state at much lower prices than they have been selling to dealers who have been their customers for a long time," Mr. Cunningham said, "and our duty is to investigate this matter and see which cement manufacturers did so. Not all of them have sold the state cement at greatly reduced rates, but we have reason to believe that some of them did."—*Charlotte* (N. C.) *Observer.*

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, N. J.	.....	.65	1.25	1.25	1.15	1.15
Attica and Franklinville, N. Y. (a)	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75	.....	1.75	1.75
Buffalo, N. Y.	1.10	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.70	.90	1.25	1.25	.....	.....
Leeds Jct., Me., and Milton, N. H.	.....	.50	1.75	1.75	1.25	1.00
Machias Junction, N. Y.	.65	.65	.65	.....	.65	.65
Montoursville, Penn.	1.00	.75	.75	.60	.50	.50
Northern New Jersey	.30–.50	.30–.50	.90–1.25	.....	.90–1.25	.....
Scarboro, Me.	.....	1.00	2.25	2.25	2.00	2.00
South Portland, Me.	.....	1.00	2.25	2.00	2.00	2.00
Georgetown, D. C.	.55	.55	1.00	1.00	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.30	.15	.20	.30	.30	.35
Attica, Ind.			All sizes .75–.85			
Barton, Wis.	.....	.40	.50	.60	.60	.60
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Crystal Lake, Ill.	.30	.15	.25	.30	.30	.40
Des Moines, Iowa	.30–.60	.30–.60	1.50–1.65	1.50–1.65	1.50–1.65	1.50–1.65
Dresden, Ohio	.....	.....	.....	.80	.70	.....
Eau Claire, Wis.	.....	.40	.55	.85	.85	.....
Elkhart Lake and Glenbeulah, Wis.	.50	.40	.40	.50	.40	.50
Grand Rapids, Mich.	.....	.50	.....	.80	.80	.70
Greenville, Ohio	.50–.70	.40–.60	.50–.60	.50–.60	.50–.60	.50–.60
Hamilton, Ohio	.65–.75	.65–.75	.65–.75	.65–.75	.65–.75	.65–.75
Hersey, Mich.	.....	.50	.....	.50	.70	.70
Humboldt, Iowa	.40–.50	.40–.50	1.10–1.30	1.10–1.30	1.10–1.30	1.10–1.30
Indianapolis, Ind.	.50.–.60	.25–.60	.40–.60	.45–.75	.45–.75	.45–.75
Kalamazoo, Mich.	.....	.50	.50	.60	.65	.75
Kansas City, Mo.	.70	.70	.....	.80	.....	.....
Mankato, Minn.	.55	.45	1.25	1.25	1.25	.....
Mason City, Iowa	.....	.50	.....	1.25	1.25	1.25
Milwaukee, Wis.	.....	.86	.86	.96	.96	.96
Minneapolis, Minn.	.35	.35	1.25	1.35	1.35	1.25
Oxford, Mich.	.25–.35	.20–.30	.30–.40	.55–.75	.55–.75	.60–.75
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.65
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.50	.....	.....	.....	.....	.....
Charleston, W. Va.	.70	1.25	1.25	.....	.....	.....
Eustis, Fla.	.....	.40–.50	.....	.....	.....	.....
Fort Worth, Texas	.75	.75	1.00	1.00	1.00	1.00
Knoxville, Tenn.	.80	1.00	1.50	1.20	1.20	1.20
Roseland, La.	.20	.20	.70	.70	.60	.....
WESTERN:						
Oregon City, Ore.			Sand for concrete, 1.00-1.50 per cu. yd. at plant			
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60	.....	1.20	.....	1.15
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.25*

*Cu. yd. ‡Delivered on job by truck. (a) Prices on trucks; on cars, 65c per ton for all sizes.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.00	.....	.....	4.00	.....
Cedarville, N. J.		Washed, 1.75 net ton; dried and washed, 2.25 net ton					
Cheshire, Mass.		Sand for soap, 7.00–8.00				6.00–8.00	.....
Columbus, Ohio	1.50	1.50	1.35	.90	.....	3.50–4.50	.....
Dresden, Ohio	1.25–1.50	1.25–1.45	1.25–1.75	.85–1.25	.....	.....	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.00–3.00	.....
Elco, Ill.		Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton					
Montoursville, Penn.	.....	.....	.....	1.35–1.50	.....	.....	.....
New Lexington, Ohio	2.00	1.25	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75*	1.75*	.....	2.00*	1.75*	1.75*	.....
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	.....
Utica and Ottawa, Ill.	.50–.65	.75–.90	.75–1.00	.75–1.00	.75–1.00	.....	1.00

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio	.....	1.00
Eau Claire, Wis.	4.30	.60–1.00
Montoursville, Penn.	.....	1.00
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.	.....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	.....	1.75

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass., in carload lots	5.00–7.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.50–3.00

Bank Run Sand and Gravel

Algonquin, Ill.¶ (½-in. and less)	.30
Buffalo, N. Y.—Sand, 1/10-in. down, 1.00; ¼-in. down, .75; gravel, all sizes	.75
Burnside, Conn. (sand, ¼-in. and less)	.75*
Crystal Lake, Ill.¶ (½-in. and less)	.25
Fort Worth, Tex.¶ (2-in. and less)	.65
Gainesville, Tex.¶ (1½-in. and less)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (1-in. and less.)	.55
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ (1-in. and less)	.50
Mankato, Minn.†	.70
Oregon City, Ore.—River run	1.00–1.50
Winona, Minn.†	.60
York, Penn.—Sand, 1/10-in. down, 1.10; ¼-in. and less	1.00

*Cubic yard. †Fine sand, 1/-10-in. down. (a) Cu. yd., delivered Chicago. ¶Gravel.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.82½	3.30	4.30¶
Atlanta, Ga.	.....	2.19†	3.49¶
Baltimore, Md.	.....	2.26*	3.56¶
Berkeley, Calif.	.....	2.14	.....
Birmingham, Ala	.....	1.85†	3.15¶
Boston, Mass.	.47	1.88†	3.27¶
Buffalo, N. Y.	.61¼	2.05†	3.35¶
Butte, Mont.	.90¼	3.61	.....
Cedar Rapids, Ia.	.....	2.23*	.....
Centerville, Calif.	.....	2.14	.....
Charleston, S. C.	.....	a2.29†	3.26¶
Cheyenne, Wyo.	.61½	2.46	.....
Chicago, Ill.	.....	1.95*	3.25¶
Cincinnati, Ohio	.....	2.14*	3.44¶
Cleveland, Ohio	.....	2.04*	3.34¶
Columbus, Ohio	.....	2.12†	3.47¶
Dallas, Texas	.....	†1.90	3.49¶
Davenport, Iowa	.....	2.14*	.....
Dayton, Ohio	.....	2.14†	3.44¶
Denver, Colo.	.66¼	2.65	.....
Des Moines, Iowa	.48½	1.94	.....
Detroit, Mich.	.....	1.95*	3.25¶
Duluth, Minn.	.....	2.04*	.....
Fresno, Calif.	.....	2.33	.....
Houston, Texas	.....	†2.00	3.73¶
Indianapolis, Ind.	.54¾	1.99*	3.29¶
Jackson, Miss.	.....	2.29†	3.59¶
Jacksonville, Fla.	.....	b2.34†	3.26¶
Jersey City, N. J.	.....	2.13†	3.43¶
Kansas City, Mo.	.50½	2.02	3.22¶
Los Angeles, Calif.	.43	1.72	.....
Louisville, Ky.	.55½	2.12–2.15†	3.42¶
Memphis, Tenn.	.....	2.29†	3.59¶
Merced, Calif.	.....	2.01	.....
Milwaukee, Wis.	.....	2.10*	3.40¶
Minneapolis, Minn.	.....	2.27*	.....
Montreal, Que.	.....	1.60‖	.....
New Orleans, La.	.43	1.92†	3.22¶
New York, N. Y.	.50¾	2.03*	3.33¶
Norfolk, Va.	.....	1.97†	3.27¶
Oklahoma City, Okla.	.61½	2.46	3.66¶
Omaha, Neb.	.59	2.36	3.56¶
Peoria, Ill.	.....	2.12*	3.32¶
Pittsburgh, Penn.	.....	1.95*	3.25¶
Philadelphia, Penn.	.....	2.15*	3.45¶
Phoenix, Ariz.	.....	3.51	.....
Portland, Ore.	.....	2.50‡	.....
Reno, Nev.	.....	2.76‡	.....
Richmond, Va.	.....	2.32†	3.62¶
Sacramento, Calif.	.....	2.25	.....
Salt Lake City, Utah	.70¼	2.81	.....
San Antonio, Texas	.....	.....	3.42¶
San Francisco, Calif.	.....	2.24‡	.....
Santa Cruz, Calif.	.....	2.10	.....
Savannah, Ga.	.....	a2.29†	3.16¶
St. Louis, Mo.	.48¾	1.95†	3.25¶
St. Paul, Minn.	.....	2.27*	.....
Seattle, Wash.	.....	1.50–1.75	†2.50c
Tampa, Fla.	.....	2.00†	3.41¶
Toledo, Ohio	.....	2.20*	3.50¶
Topeka, Kan.	.55¼	2.21	3.41¶
Tulsa, Okla.	.58¼	2.33	3.53¶
Wheeling, W. Va.	.....	2.02†	3.32¶
Winston-Salem, N. C.	.....	2.44†	3.54¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.	.....	2.15	.....
Bellingham, Wash.	.....	2.25	.....
Bonner Springs, Kan.	.....	1.85	.....
Buffington, Ind.	.....	1.70	.....
Concrete, Wash.	.....	2.65	.....
Davenport, Calif.	.....	2.05	.....
Hannibal, Mo.	.....	1.80	.....
Hudson, N. Y.	.....	1.85	.....
Independence, Kan.	.....	1.85	.....
Leeds, Ala.	.....	1.70	.....
Limedale, Ind.	.....	1.70	.....
Lime & Oswego, Ore.	.....	2.50	.....
Nazareth, Penn.	.....	2.15	.....
Northampton, Penn.	.....	1.75	.....
Richard City, Tenn.	.....	2.05	.....
Steelton, Minn.	.....	1.85	.....
Toledo, Ohio	.....	2.20	.....
Universal, Penn.	.....	1.70	.....
Waco, Tex.	.....	1.85	.....

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. ‡Subject to 2% cash discount. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‖Includes sales tax. (c) Quick-hardening "Velo."

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn.	.60	1.30	1.30	1.00	1.00	.....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Jamesville, N. Y.	1.00	1.00	1.00	1.00	1.00	.....
Oriskany Falls, N. Y.	.50–1.00	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35
Prospect Junction, N. Y.	.50– .80	.....	1.00–1.15	1.00–1.10	1.00–1.10	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Hillsville, Penn.	.85	1.35	1.35	1.35	1.35	1.35
Shaw's Junction, Penn. (e)	.85	1.20–1.35	1.20–1.35	1.20–1.35	1.40	1.30–1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill. (b)	2.00	.....	2.00	.....	.....	.....
Afton, Mich.	.....	.....	.....	.25	.....	1.50
Cypress, Ill.	.....	1.00	1.00	.90	.90	.85
Davenport, Iowa	1.20	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	1.00	1.00	1.00	1.10	1.10	1.10
Dundas, Ont.	.50	.80	.80	.70	.70	.....
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.10	1.00	.90	.90	.90
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75–1.00	1.65–1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.10	1.10	.....	.....	.....	.....
Stone City, Iowa	.75	.....	1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.70	.....	1.60	.....	1.60
Toronto, Canada	2.50	3.00	2.50	2.50	2.50	2.50
Waukesha, Wis.	.....	.90	.90	.90	.90	.....
Wisconsin points..	.50	.....	1.00	.90	.90	.....
SOUTHERN:						
Cartersville, Ga.	1.15	1.35	1.35	1.15	1.00	1.00
Chico, Texas	.75	1.30	1.25	1.20	1.15	.....
Cutler, Fla.	.50r	1.75r	1.75r	1.75r	1.75r	1.50r
El Paso, Texas (v)	.75r	1.25	1.25	1.00	1.00	1.00
Graystone, Ala.	Crusher run stone 1.00 per net ton					
Olive Hill, Ky.	.50–1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.40	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.00	1.00	1.00	.....
Richmond. Calif.	.75	.....	1.00	1.00	1.00	.....
Rock Hill, St. Louis Co., Mo.	1.30–1.40	1.30–1.40	1.10–1.40	1.30–1.40	1.30–1.40	1.30–1.40
Stringtown, Okla.	1.00	1.15	1.20	1.15	1.00	1.00

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Farmington, Conn.	1.00	1.30	1.30	1.00	1.00	.....
Duluth, Minn.	1.00	2.25	1.75	1.65	1.35	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.25	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	1.15	1.25	1.50	1.30	1.15	1.10
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.35	2.10	1.90	1.50	1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Toronto, Canada	4.70	5.80	4.05	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.....	.....	1.60	1.60	1.50	.....
Chicago, Ill.—Granite	2.00	1.70	.....	1.50	1.50	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.50	1.40	1.25	1.15	.....
Lohrville, Wis.—Granite	1.80	1.60	.....	1.50	1.50	.....
Middlebrook, Mo.—Granite	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Toccoa, Ga.—Granite	.50	1.35	1.35	1.25	1.25	1.20

(b) Wagonloads. (c) 1 in., 1.40. (d) 2-in., 1.30. (e) Price net after 10c discount deducted. (h) Rip rap. (n) Ballast, R. R., .90; run of crusher, 1.00. (q) Crusher run, 1.40; ¼-in. granlithic finish, 3.00. (r) Cu. yd. (t) Rip rap, 1.20–1.40 per ton. (v) Roofing stone, 1.50 per ton.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn.	1.25–1.75	.50– .60	1.00–1.25	.60– .80	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.50	.70	1.00	1.15	1.15	1.15	1.15
Reading, Penn.	2.00	1.00	.....	1.00	.....	.....	.....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	.....
Jackson, Ohio	2.05*	.65*	1.80*	1.30*	1.05*	1.30*	.....
Toledo, Ohio	1.50	1.10	1.35	.135	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05*	1.05*	1.80*	1.45*	1.45*	1.45*	.....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1½-in. to ¼-in., 1.05; ⅝-in. to 10 mesh, 1.25*; ⅝-in. to 0-in., 90c*; ¼-in. to 10 mesh, .80*.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 99% $CaCO_3$; 0.3% $MgCO_3$, 90% thru 100 mesh	4.50
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Carterville, Ga.	2.00
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton	6.00
Gibsonburg, Ohio—Bulk, 2.25; in bags	3.70
Hillsville, Penn.	2.10–4.50
Jamesville, N. Y.—Bulk, 3.50; in 80-lb. bags	4.75
Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh	3.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk	2.50
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.25
Olive Hill, Ky., per ton	.50–1.00
West Rutland, Vt. — Analysis, 96.5% $CaCO_3$; 1% $MgCO_3$, in 100-lb. burlap bags, per ton	4.50

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98.44% $CaCO_3$; .83% $MgCO_3$; 90% thru 10 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	1.50
Chico, Tex.—(Agstone, ⅛-in. down), per ton	1.00
Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder	3.50
Cypress, Ill. — Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.25; 50% thru 100 mesh, 1.15; 90% thru 50 mesh, 1.15; 50% thru 50 mesh, 1.15; 90% thru 4 mesh, 1.15, and 50% thru 4 mesh	1.15
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton	1.20
Dubuque, Ia.—Analysis, 64.04% $CaCO_3$; 29.54% $MgCO_3$; 50% thru 100 mesh	1.00
Dundas, Ont.—Per ton	1.00
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh; bulk, per ton	1.15–1.50
Gibsonburg, Ohio—90% thru 10 mesh	1.00–1.50
Hillsville, Penn.—90% thru 100 mesh, 50% thru 100 mesh and 90% thru 50 mesh	1.00–4.50
Lannon, Wis. — Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼-in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh	.80
Osborne, Penn.—100% thru 20 mesh, 60% thru 100 mesh, and 45% thru 200 mesh, per ton	a5.00
Piqua, Ohio—30%, 50% and 99% thru 100 mesh	1.00–4.00
Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags	3.50
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.15–1.70
Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk	3.50
100-lb. paper bags, 4.75; 100-lb., cloth	5.25
Waukesha, Wis.—90% thru 100 mesh, 3.50; 50% thru 100 mesh	2.10

*Less 25c cash 15 days. (a) Less 50c commission.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Hillsville, Penn.—Sacks, 5.10; bulk	3.50
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh (bags extra)	3.50
Piqua, Ohio—99% thru 100 mesh, bulk, 3.25; in 80-lb. or 100-lb. bags	4.25
Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	3.50

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	11.40	.....	.....	17.50	.....	20.65
Knickerbocker, Devault and Rambo, Penn.*	.....	9.50b	9.50b	9.50b	8.00	9.50	8.50	.....
Lime Ridge, Penn.	.....	.....	8.50	.....	6.50	8.00[3]	4.50	.....
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.50	6.50	.....
Carey, Ohio	9.50	6.50	6.50	.....	8.00	.....	8.00	.....
Cold Springs, Ohio	.....	7.75	7.75	.....	.....	.....	7.00	.....
Gibsonburg, Ohio	10.50	.....	.....	.....	7.00	9.00[9]	.....	.....
Little Rock, Ark.	.....	14.40	.....	14.40	.....	.....	11.90	17.90
Luckey, Ohio*	10.50	7.75	7.75	.....	.....	.....	7.00	.....
Marblehead, Gibsonburg, Marion, Sandusky, Tiffin and White Rock, Ohio	10.50	7.75	7.75	11.00	7.00	9.00	7.00	.....
Milltown, Ind.	.....	9.00	8.25	9.50	7.50	.....	7.00	.....
Scioto, Ohio	10.50	6.50	6.50	7.50	.....	.....	6.00	.....
Sheboygan, Wis.	.....	10.50	10.50	10.50	.....	.....	9.50	20.00
Wisconsin points	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	10.50	7.75	7.75	11.50[24]	7.00	9.00[9]	7.00	15.00c
SOUTHERN:								
Cartersville, Ga.	.....	9.00	.....	.....	.....	13.50	.....	15.00
Graystone, Ala.*	12.50	9.00	.....	12.50	.....	.....	7.50	.....
Keystone, Ala.	17.00	9.00	.....	7.00– 9.00	.....	.....	5.00a	14.85
Knoxville, Tenn.	20.00	9.00	9.00	7.50	7.50	.....	7.50	27.00
Ocala, Fla.	.....	10.50	.....	.....	.....	.....	.....	.....
Pine Hill, Ky.	.....	9.00	8.00	9.00	.....	.....	.....	12.50
WESTERN:								
Colton, Calif.	.....	.....	.....	.....	9.50[4]	.....	.....	.....
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	20.00
Los Angeles, Calif.	16.00	13.00	13.00	.....	.....	.....	12.00	22.90
San Francisco, Calif.†	16.00	14.00	6.00–12.00	14.00–19.00	14.50[20]	.....	11.00[19]	.....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[20]	.....	11.00[19]	.....

[1]Also 6.00. [2]To 1.35. [3]In 100-lb. bags. [4]To 11.85 per ton, granular but not ground, ¾-in. screen down to 14 mesh. [9]In 80-lb. paper. [19]Per bbl. [11]In wood; in steel, 11.60. [17]Less credit for return of empties. [18]To 14.50. [20]Also 13.00. [24]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime: finishing hydrate 20.00 per ton, pulv. lime 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. ‡To 6.00. ¶To 13.50. (a) To 8.50. (b) In bags. (c) In wood; in steel, 16.00.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 100% thru 200 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton.

Granville, N. Y.—Red, green and black, $7.50 per ton.

Pen Argyl, Penn.—Blue-black, 6.00 per ton in bulk, plus 10c per bag.

Roofing Slate

City or shipping point:	Prices per square—Standard thickness. 3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—						
Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.00–14.00	20.00	25.00	29.00	40.00	50.00
No. 1 ribbon	9.00–10.25	16.00	20.00	25.00	35.00	46.00
Gen. Bangor No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
No. 1 Albion	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Chapman Quarries, Penn.	7.75–11.25	13.00–15.00	19.00–22.00	23.00–28.00	27.00–30.00	32.00–35.00
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Pen Argyl, Penn.						
Graduated slate	.....	16.00	23.00	27.00	37.00	46.00
No. 1 clear (smooth text)	7.25–10.50; Albion-Bangor medium, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mt., No. 1 & No. 2 clear	8.00– 9.50	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point

Chatsworth, Ga.:	
Crude talc, per ton	5.00
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	9.00
Pencils and steel crayons, gross	1.50– 2.00
Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¾% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh	7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.	
Clifton, Va.:	
Ground talc (150-200 mesh), in bags	10.00
Conowingo, Md.:	
Crude talc, bulk	4.00
Ground talc (150-200 mesh), in bags	14.00
Cubes, blanks, per lb.	.10
Emeryville, N. Y.:	
Ground talc (200 mesh), bags	13.75
Ground talc (325 mesh), bags	14.75
Hailesboro, N. Y.:	
Ground talc (300-350 mesh), in 200-lb. bags	15.50–20.00
Henry, Va.:	
Crude (mine run), bulk	3.50– 4.50
Ground talc (150-200 mesh), bags	6.25– 9.75
Joliet, Ill.:	
Ground talc (200 mesh) in bags:	
California white	30.00
Southern white	20.00
Illinois talc	10.00
Los Angeles, Calif.:	
Ground talc (150-200 mesh), in bags	15.00–25.00
Natural Bridge, N. Y.:	
Ground talc (325 mesh), bags	10.00–15.00

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-70%	3.50– 4.00
Mt. Pleasant, Tenn.—B.P.L. 76-78%	6.75

Ground Rock
(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65-70%	3.75– 4.25
Mt. Pleasent, Tenn.—Lime Phosphate: B.P.L. 73.25%	11.80
Mt. Pleasant, Tenn.—B.P.L., 72%	5.00– 5.25

Florida Phosphate

(Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines	
68/66% B.P.L.	3.15
70% minimum B.P.L.	3.75
72% minimum B.P.L.	4.25
75/74% B.P.L.	5.25
77/76% B.P.L.	6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	100.00–125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, Bristol and Cardigan, N. H.—Per ton:	
Punch mica, per ton	150.00–240.00
Mine scrap	22.50
Mine run	325.00
Clean shop, scrap	25.00
Roofing mica	37.50
Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh	60.00
Spruce Pine, N. C.—Mine scrap, per ton	20.00
Trenton, N. J.—Mine scrap, per ton, f.o.b. mines	20.00

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Centerville, Iowa	.....	.....	6.00	7.00	.....	7.50	8.50	10.50a	.....	.....	.....	.....	.....
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton, floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.													
Fort Dodge, Iowa	2.50	6.00	6.00	7.00	9.00	9.00	11.50	8.00	16.00	20.00	15.00	.....	25.00
Grand Rapids, Mich. (h)	.....	.....	7.00	9.00	9.00d	9.50d	19.50	8.00d	26.00	20.00d	.....	.....	25.00
Los Angeles, Calif. (b)	3.90	7.50	7.00–7.50	8.00–8.20	9.00	.....	9.00	.....	.....	.....	.....	.....	.....
Medicine Lodge, Kan.	1.40	.....	.....	.....	.....	.....	11.50d	.....	16.00d	.....	.....	.....	.....
Oakfield, N. Y.	3.00	.....	.....	6.00	9.00d	9.00d	.....	6.00	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	9.00	9.00	9.00	20.00	8.00	25.50	20.00i	.....	15.00	25.00
Portland, Ore.	7.50	.....	11.50d	16.00d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Providence, R. I. (x)	.....	.....	.....	12.00–13.00e	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	6.00	.....	10.20d	13.90d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.60	.....	10.00d	14.00d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, ⅜x32x36-in., 16c per yd. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (g) ⅜x48-in. by 3 to 4 ft. long. (h) Gypsum lath, per M sq. ft., 15.00. (i) To 26.00. (x) "Fabricate" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7¼c-8¼c. Block setting plaster, per ton, in jute sacks. 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags; bulk, per ton	.....	7.50
Crown Point, N. Y.—Mica Spar	.....	¶9.00–‖12.00
Davenport, Iowa — White limestone, in bags, per ton	‖6.00	‖6.00
Harrisonburg, Va.	12.50–14.50	.....
Middlebrook, Mo.—Red	.....	20.00–25.00
Middlebury, Vt. — Middlebury white	.....	¶9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	.....	c5.50
Phillipsburg, N. J.—In bags	.....	10.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Tuckahoe, N.Y.—Tuckahoe white	7.00	.....
Warren, N. H. (d)	.....	‖8.00– 8.50
Whitestone, Ga.	.....	10.00

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton	18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140 mesh (bulk)	19.00
Keystone, S. D.—Color, white; analysis, K_2O, 12.30%; Na_2O, 2.28%; SiO_2, 64%; Fe_2O_3, .05%; Al_2O_3, 19.50%, pulverized, 100% thru 140 mesh, in bags, 16.00; bulk	15.00
Coatesville, Penn.—Color, white, analysis, K_2O, 12.30%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; crude, per ton	8.00
Erwin, Tenn.—White; analysis, K_2O, 10.50%; Na_2O, 2.76%; SiO_2, 67.92%; Fe_2O_3, .07%; Al_2O_3, 18%, pulverized, 99% thru 200 mesh, in bags, 16.20; bulk	15.00
Crude, in bags, 8:20; bulk	7.00
Rumney and Cardigan, N. H. — Color, white; analysis, K_2O, 9-12%; Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 61-68%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk (bags, 15c extra)	18.00

Cement Drain Tile

Graettinger, Iowa — Drain tile, per foot; 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Grand Rapids, Mich.—Drain tile, per 1000 ft.	
4-in.	36.00
5-in.	48.00
6-in.	66.00
8-in.	100.00
10-in.	150.00
12-in.	210.00
Longview, Wash.—Drain tile, per 100 ft.	
3-in.	5.00
4-in.	6.00
6-in.	10.00
8-in.	15.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00

Chicken Grits

Centerville, Iowa	9.25
Cypress, Ill.—(Agstone)	1.15
Belfast, Me.—(Agstone), per ton, in carloads	10.00
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per 100-lb. sack	1.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Cranberry Creek, N. Y.—Per ton, in carload lots, in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton	6.00
El Paso, Tex.—(Limestone), per 100-lb. sack	.75
Los Angeles, Calif.—(Gypsum), per ton, including sacks	7.50– 9.50
Middlebury, Vt.—Per ton (a)	10.00
Piqua, Ohio—(Pearl grit), No. 1 and No. 2	1.00– 4.00
Port Clinton, Ohio—(Gypsum), per ton	6.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	‖7.50–‖9.00
Wisconsin points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis. (at plant)	9.50
Dayton, Ohio	12.50
Detroit, Mich. (d)	13.00–15.50
Farmington, Conn.	16.00
Flint, Mich.	*14.00–15.50b
Grand Rapids, Mich.*	14.50
Iona, N. J.	10.50–12.00
Jackson, Mich.	13.00
Madison, Wis.	12.50a
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00*
Mishawaka, Ind.	11.00
New Brighton, Minn.	8.00
Pontiac, Mich. (e)	15.50
Portage, Wis.	15.00
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.00
Sebewaing, Mich. (at yard)	12.50
South River, N. J.	11.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada	12.00–b13.00*
Wilkinson, Fla.—White, 10.00; buff	14.00
Winnipeg, Canada	15.00

*Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10 days. (c) Delivered in city. (d) Also 12.00. (e) Truck delivery.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Appleton, Minn.	18.00–20.00
Franklin Park, Ill.:	
8x8x16. Per 1000	180.00
Chicago, Ill.:	
8x 8x16. Each	.21†
8x 8x16. Each	.18b
8x10x16. Each	.25†
8x10x16. Each	.22b
8x12x16. Each	.28†
8x12x16. Each	.25b
Columbus, Ohio: 8x8x16	14.00b–16.00a
Forest Park, Ill.	21.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Lexington, Ky.:	
8x8x16	a18.00*
8x8x16	b15.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.
†Rock or panel face.
(a) Face. (b) Plain. (c) Common.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Clyde, Ill.—French tile, 8½x15 in., per sq., 9.50–12.00; Spanish, 8½x15 in., per sq., 10.00–12.00; English Shingle, 7¼x12½ in., per sq., 13.50–15.50; Closed End Shingle, 8x12½ in., per sq.	11.00–13.00
Detroit, Mich.—5x8x12, per M	67.50
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Lexington, Ky.—8x15, per sq.:	
Red	15.00
Green	18.00
Longview, Wash.:	
4x6x12-in., per 1000	55.00
4x8x12-in., per 1000	65.00

Cement Building Tile

Chicago District (Haydite):	
8x 4x16, per 1000	140.00
8x 8x16, per 1000	200.00
8x12x16, per 1000	300.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Lexington, Ky.:	
5x8x12, per 1000	55.00
4x5x12, per 1000	35.00
Longview, Wash. (Stone Tile):	
4x6x12, per 1000	57.50
4x8x12, per 1000	65.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	.....
Chicago District "Haydite"	14.00	.....
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	10.00–13.00a	.....
Forest Park, Ill.	.....	37.00
Longview, Wash.	16.50	23.00– 40.00
Milwaukee, Wis.	14.00	22.00
Omaha, Neb.	18.00	30.00– 40.00
Philadelphia, Penn.	15.50	.....
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	22.50– 25.00
Rapid City, S. D.	18.00	25.00– 40.00

(a) Delivered on job; 10.00 f.o.b. plant.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.	.....	53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.	.....	55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.	.....	60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10-in.	12-in.	15 in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich. (b)																	
Sewer	.....	.12	.18	.27½	.35	.47	.92½	1.11	.....	1.66½	2.47	2.73⅓	.....	.....	.....	.....	.....
Culvert	.....	.....	.....	.57	.67	.93	1.20	.....	.....	1.80	2.10	2.25	3.35	4.00	5.60	6.90	7.85
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Newark, N. J. (d)	.....	.....	.....	.....	.90	1.15	1.50	.....	.....	1.85	2.35	2.76	3.77	4.93	6.21	7.66	9.28
Unreinforced	.....	.16	.25	.38	.48½	.65	.90	.....	.....	1.62	.....	.....	.....	.....	.....	.....	.....
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Tacoma, Wash.	.14	.16	.22	.32	.45	.64	.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (c)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31

(a) 24-in. lengths. (b) Sewer. 21-in., 1.48; culvert, 21-in., 1.45. †21-in. diam. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced; 21-in., 1.69; unreinforced, 21-in., 1.26; 5% cash discount.

Pertinent Paragraphs

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Interesting items from everywhere condensed and "abstracted" for the benefit of busy readers

By Hugh Sharp

ALMOST unusual advertisement, in colors, occupied the front cover of a prominent English crushed stone trade paper recently. The British Quarrying, Ltd., with headquarters in London, contracted for this space, used it for telling the world that it had received an order for 450,000 tons of "roadstone," and put further emphasis in the copy by saying that it was "the largest single order for roadstone ever placed in England.

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WILLIAM ROBERT COLEY, a "fitter" employed in an English quarry, is the proud possessor of a silver medal received from the British S. P. C. A. and a substantial sum of money from his employers, as the result of his thrilling rescue of a dog from a ledge in a quarry near Leicestershire. Just how the canine managed to find its uncomfortable lodging place is not known. It was discovered perched on a yard-wide ledge 60 ft. from the top of the quarry and 240 ft. from the bottom, unable to extricate himself and facing the possibility of dying by starvation or suicide by plunging. That it did not intend to invite either was evidenced in the commotion created, nearly loud enough to be heard in Buckingham Palace. Mr. Coley had himself lowered over the face of the quarry and sent the dog up, safely looped, a risky proceeding for a man more than fifty years old. The other employes were so entranced over witnessing the valorous deed that they almost forgot to rescue the "fitter."

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PUBLIC construction, including repairs and maintenance, will involve an expenditure of about $3,500,000,000 in 1930, according to an estimate gained from federal, state, county and municipal officials by Dr. John M. Gries, chief, Division of Public Construction, Department of Commerce, Washington. This is a division recently created by Secretary of Commerce R. P. Lamont at the request of President Hoover to act as a clearing house to expedite all governmental construction work. Dr. Gries declared that he felt safe in saying highways and streets constitute more than half of the total expenditure. The government program amounts to about $275,000,000, not including the $80,000,000 or more for federal highway aid.

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READERS are invited to contribute pertinent paragraphs that grow out of little unusual happenings in their daily round of occupation. If you desire, just send us the facts. We will see that they get in. If this meets the eagle eye of our own Mr. Lenhart we hope that it will bring many interesting yarns from his palpitating propinquity to production in Pennsylvania peregrinations.

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THAT the new tariff will reduce still further the dwindling exports of Aberdeen granite to this country and make it relatively easier for Germany and Czecho-Slovakia to capture American trade is the fear expressed by a writer in the *Glasgow Bulletin*. Many Aberdeen merchants have laid the foundations of their business on American export trade but in the last thirty years there has been a general recession of business. Roughly estimated, the trade has fallen from a total of £81,763 thirty years ago to £4,600 last year.

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RESIDENTS of Chicago who have suffered the annual summer irritation of failing water supply were quite intrigued the other day to read an announcement that the city water department contemplated using abandoned quarries within the city limits as reservoirs for supplying certain deficient sections of town. The almost self-obvious fact that the average quarry is of such low level as to make it not readily serviceable for a project of this kind was revealed later in the report of the city engineer. He also said that present old quarry facilities might hold 5,000,000 gallons, almost a drop in the bucket compared with the city's daily billion gallon pumpage.

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PRESIDENT GERALD SWOPE of the General Electric Co. announces an unemployment plan that is considered an advanced step in solving a problem which has been and still is agitating the manufacturing world. The General Electric scheme, in brief, provides that in case of abnormal times of unemployment, normal contributions by participating employes would cease and all employes would be called upon to contribute. When employes who are laid off can aid themselves no longer then those employes who are still working contribute toward the aid of the men laid off while the company will itself contribute in both instances to an equal extent to that of the participating employes.

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AN electric kiln for manufacturing cement and lime has been patented in England by H. J. Benham. In his application Mr. Benham states that powdered raw material is delivered by plates, arranged inside a shaft, into a chamber wherein it is fused between electrodes. Waste gases from the chamber are baffled by the plates and pass through a rotary preheating tube into which the charge is initially fed, and which has holes at one end and around the circumference to allow preheated raw material to be discharged into the pulverizer.

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THE United States consumes about 60,000,000 lb. of graphite in all forms, two-thirds of which is imported largely from 10 countries. Amorphous grades represent most of the tonnage. Mexico supplied about 71% of the United States' foreign requirements in 1929. Ceylon furnished 93.4% of the total crystalline lump graphite and France shipped about 89% of the crystalline flake grade. Total imports had a value of $1,065,186 in 1929, an increase of 32% over 1928.

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ROCK asphalt is a highly fossiliferous limestone, the pores of which contain pure, hard bitumen. Outside of a few quarries in Europe and several fields in this country, not a great deal of rock asphalt is produced. Southwest Texas and Kentucky ship most of the product. The open pit method of quarrying is carried on and because of the extremely tough quality of the rock quick-acting explosive is used in holes spaced closely together. The size of rock requires enormous crushers but the material is brought down to ¼- to ¾-in. sizes by screening and is hand picked before going to the storage piles. Some of it is pulverized for ready-mixed cold process paving material.

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A PROMINENT English railway company reports the construction of the first concrete railway car. The sides, floor, and roof of this "wagon" are all composed of concrete reinforced with steel; a standard steel underframe and standard fittings have been provided. Certain of the main girders have been anchored in the concrete floor to avoid holding-down bolts. The weight of the new concrete car is 20 tons.

Electric Welding in Cement Plants

Thousands of Dollars Being Saved Annually by Use of This Modern Process of Repairing Metal Parts

By J. F. Lincoln
President, Lincoln Electric Co., Cleveland, Ohio

THE maintenance of manufacturing equipment has been one of the largest items of overhead expense in cement plant operation. The coarse, gritty nature of cement in its various stages of manufacture causes exceptional wear on the metal of the production equipment and it has been necessary to replace the worn or broken parts with new ones, which are usually very expensive.

With the increased use of the electric arc welding process this condition has been improved. Today broken or worn parts can be built up or repaired and returned to service by the electric arc welding process, and the repairs are as substantial as a new part and much more economical. Thousands of dollars are being saved annually in many of these plants by the use of this modern process in fabricating and repairing metal parts.

Fig. 3. Showing an operator rebuilding a worn shaft by use of the electric arc

The applications of the use of the electric arc welding process within a cement plant are many and varied. They apply to pumps, conveying systems, mills, crushers, kilns, gears, and, in fact, every place where metal is used. This modern process is also being used extensively in construction work as well as in the service departments.

Building Up Worn Gears

One of the most interesting applications of the use of electric arc welding in a cement plant is that of building up worn parts, such as gears or shafts. It is estimated that in these two jobs alone the cost of maintenance and repairs can be reduced about one-fourth. An excellent example of a case where a considerable saving was effected by the use of the electric arc is shown in Figs. 1 and 2. Fig. 1 shows a gear which has been built up and returned to service by the use of the electric arc, and Fig. 2 shows a similar gear ready to be built up by this modern process. These gears are in use in the plant of the Southwestern Portland Cement Co., manufacturers of Miami cement, at Osborn, Ohio.

The gear shown in Fig. 1 is used to drive the clinker cooler. It is 10 ft. in diameter and weighs approximately two tons. It fits around the cooler, transferring the power of a 50-hp. motor to this cooler, causing it to rotate. It would cost approximately $1,000 to replace this gear with a new one, but by using the electric arc it was possible to rebuild the teeth and return it to service at a cost of $175.

The repair to the clinker cooler gear was made in 130 hours. Small pieces of low carbon steel were placed on the worn side of each tooth and fused to the worn tooth by the electric arc. This operation has been done as often as three times on one of these cast steel gears.

Rebuilding Worn Shafts

As has been mentioned, the rebuilding of worn shafts by the electric welding process is another application very commonly found in cement plants. It is estimated that rebuilding these shafts saves from $2,000 to $5,000 annually in cement plant operation. Fig. 3 shows an operator building up a worn shaft. In this operation a complete layer of metal is deposited by the electric arc from a metallic electrode and the shaft is then turned down on a lathe to the correct size.

The rebuilding of large shafts by the electric arc welding process is the only reliable way of repairing them. The only other alternative would be to replace them with new shafts, but that would take much longer, because under ordinary circumstances the new shaft would have to be manufactured to order. A new shaft would also cost many times more than a repair job.

Fig. 5. A cement pump screw which was repaired and returned to service in two hours. The electric welding process was used to deposit the metal

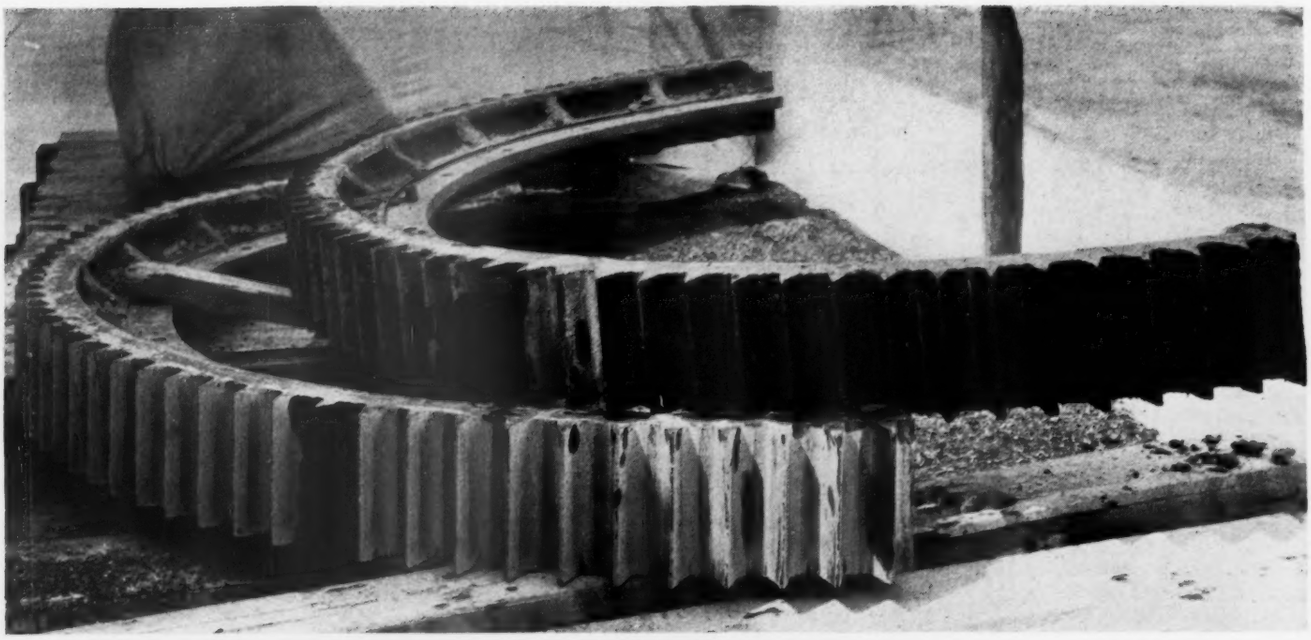


Fig. 1. This large gear has been rebuilt after being worn down in service

Fig. 2. Showing a similar gear to that illustrated in Fig. 1 before it was repaired. Note the amount of wear on the teeth

There are cases on record where the repair of a single shaft has effected a saving of thousands of dollars. Shafts can be repaired in this manner many times and give service equally as good as new ones.

Repairing Wear on Slurry Pumps

Another interesting application of arc welded repair in cement plants is shown in Fig. 4. It is an illustration of two slurry pump cases, one of which has been repaired and the other showing the nature of the wear on these cases. They are a part of the pumps used to convey the slurry from the mills to slurry storage, and from storage into the filter as it is needed. The slurry, crushed rock mixed with water, is pumped through the lines in its course through the plant at the rate of 200 bbl. per hour. It is a thick, gritty mud that wears the metal parts down very rapidly.

The method of building up these cases differs with the extent of wear. Where it is not exceptionally bad, sufficient metal may be deposited by the electric arc to build up the case within a short time. Where the wear is bad, however, the best way to repair the case is to weld a ring of steel in place as shown on the left in Fig. 4. The slurry moving through the pump also wears away the walls of the case so that they become quite thin. These walls may be built up to approximately their original thickness, as shown on the right in Fig. 4, by the electric arc.

In repairing the case of a slurry pump by the use of the electric arc, a savings of approximately $25 may be effected. These cases are of cast steel and weigh about 400 lb. each. They can be built up and returned to service in approximately 9 hours.

A Quick Pump Screw Repair Job

Fig. 5 shows a cement pump screw which has been built up by the electric welding process. This screw is used to pump the cement from the finish mills into storage and from storage into the sacking department. A screw as shown in the illustration weighs 600 to 700 lb. and costs approximately $275. It was repaired and made ready for service with Stellite rod and a Stable-Arc welder in about 2 hours. The saving on this type of repair work within a cement plant becomes a sizable amount within a year.

The compartments in the raw mill very often wear through so that they have to be repaired or replaced. By the use of the electric welding process, however, these compartments can be repaired without removing them from the mill. Fig. 6 shows the repair of the star plate of one of these compartments. The star plate holds the sections together at the center of the compartment. It is fabricated of 1½- and ¾-in. plate joined by the welding process.

These are only a few of the many applications of the electric arc welding process found in cement plants. It is being used in the fabrication and repair of all types of mechanical and structural designs and has come to be looked upon as being indispensable. Special fixtures, fittings and piping through which the cement is pumped are all built and kept in repair by this process. In the plant of the Southwestern Portland Cement Co., at Osborn, Ohio, two portable welders, two operators and two helpers are kept busy constantly making needed repairs and keeping the manufacturing equipment in good condition generally.

The electric arc welding process is used today in practically every industry either as a manufacturing process or as a means of repairing worn or broken parts. In industries such as the manufacture of cement it is invaluable because of the enormous wear on manufacturing equipment even under ordinary conditions. If it were necessary to replace all damaged parts with new ones, maintenance costs would be even higher than they are now. The electric arc welding process eliminates all these extraordinary expenses.

Fig. 6. Star plate on the discharge end of a raw mill partially repaired by use of the electric arc

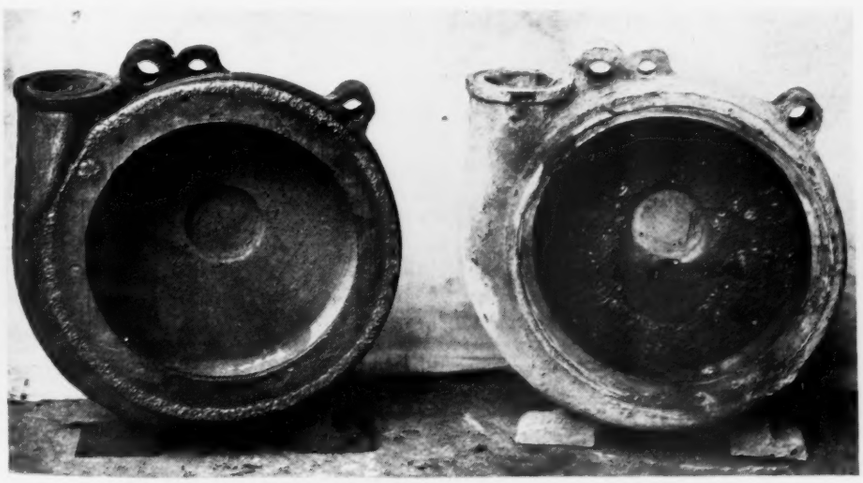


Fig. 4. The slurry pump case on the right was worn down in service. The one on the left shows a method of repairing by using a steel ring and welding

Thermal Expansion of Silica Brick and Mortars

NO VERY COMPLETE DATA have been available on the thermal expansion of American silica brick and mortar, so that the results of tests on these materials as given in a paper presented by Sanford S. Cole at the February, 1930, annual meeting of the American Ceramic Society at Toronto, Ont., are of interest.

Tests were made on various samples of both bricks and mortars by heating them to temperatures up to 950 deg. C. in a nichrome wound electric tube furnace and measuring the resulting expansion by means of an Ames dial and push rod arrangement. The test bars used were ⅜-in. square and 2½-in. long, and were cut from regular run-of-plant bricks, and molded from the mortar material in the case of the mortar tests. A clay containing 70% SiO_2 was used in compounding the mortars, which were made up of different percentages of clay and also with aggregates of different coarseness.

The results were plotted in a series of curves showing the percent. of expansion at different temperatures for mortars of different coarseness, different pyrometric cone equivalents (P.C.E.) and different percentages of added clay and various bricks.

The curves for mortars all showed the same general characteristics and shape, with critical points at approximately 250 deg. C. and 550 deg. C. and no increase in expansion between 600 deg. C. and 900 deg. C. The curves for bricks showed a more uniform increase in percent. of expansion above 250 deg. C.

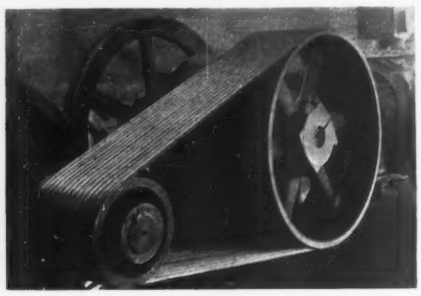
In the case of the mortars, the size of grain seemed to have only a very slight effect, the variations depending rather on the relative amounts of clay, bats and quartzite, these variations being between 1.30% and 1.52% expansion. In the case of the bricks, porosity appeared to have little or no effect, and a variation between 1.15% and 1.30% expansion at the highest point of expansion was observed in bricks from different districts. All of the results showed a greater expansion for the mortars.

New Machinery and Equipment

Drive for Power Transmission

THE DRIVE ILLUSTRATED here was recently placed on the market by the Worthington Pump and Machinery Corp., Harrison, N. J, under the trade name of the "Multi-V-Drive."

It consists of a number of endless molded V-belts running in V-grooved sheaves, and, according to the description of the manufacturers, combines a new long-life type of



Power transmission drive

rubberized, cord V-belt, impervious to dust and moisture, with an improved V-grooved sheave.

Goodyear Emerald Cord belts are used and the load-carrying members are cotton cords arranged in parallel lines and concentrated about the neutral axis. The rubber, it is claimed, is of the highest quality, and each belt in the drive takes an equal share of the transmitted load. Each sheave is grooved, machined and finished so that the grooves present a smooth surface on which the belts run, and the wedging action between the belts and the grooves results in a slipless grip which, it is said, compensates for but differs from initial belt tension in a flat belt drive, and assures maximum power transmission efficiency.

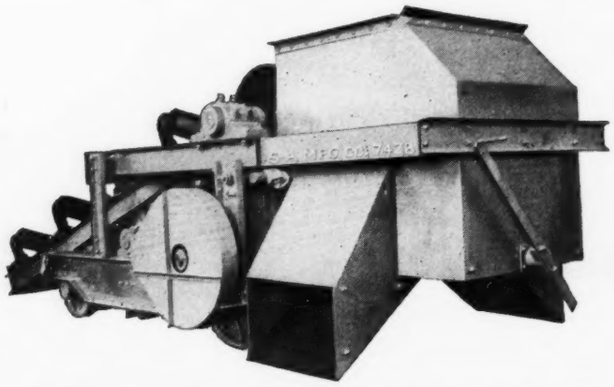
Belt Conveyor Tripper Spout

THE two-way discharge spout on the belt conveyor tripper shown here was built to stand unusual punishment, according to the manufacturers, Stephens-Adamson Manufacturing Co., Aurora, Ill.

The spout is made of ¼-in. steel plate and is not only lined with manganese steel liners, but is built with a stone box to reduce the shock and wear caused by the lumps and stones as they are discharged from the conveyor belt.

The stone box consists of a shelf on which the material piles until it reaches its angle of repose. After this the discharge is directly upon this pile of material, which cushions the impact and saves wear at the point where it is usually greatest. The flop gate lever shown can be shifted to deflect the discharge to either side of the conveyor.

The spout and tripper can be moved to discharge the belt from any point over the length of a 42-in. conveyor, having a capacity of better than 700 tons per hour, it is claimed. The tripper itself is unusually heavy, being 14 ft. long by 9 ft. wide, and weighs 14,000 lb.



Discharge spout on belt conveyor tripper is built with stone box to reduce wear

The heavy-duty axle journals and pulley shaft bearings are all equipped with Hyatt roller bearings, and all the tripper bearings are lubricated through Alemite Zerk lubrication fittings. A reversible 10-hp. motor enables the operator to drive the tripper forward or backward at a speed of 62 ft. per minute.

A revolving brush keeps the belt clean and keeps material from building up on the lower pulley, which contacts with the upper surface of the belt.

New Oxygen Regulator

THE OXWELD ACETYLENE CO., New York City, has added to its Prest-O-Weld line a new oxygen regulator designated as the Prest-O-Weld, Type R-109.

This regulator reduces the oxygen pressure from the cylinder pressure down to the required working pressure in two stages, through the medium of two independent sets of diaphragms, valves and springs. The two-stage reduction is designed to eliminate any possibility of fluctuation in working pressures.

In the first stage, the cylinder pressure is reduced through a non-adjustable reducing valve down to 150- to 200-lb. per sq. in. Leaving the first stage, the oxygen passes to a second valve and diaphragm assembly, where the pressure is reduced to that desired by the operator, the second stage reducing valve being controlled by the usual pressure adjusting screw.

When the cylinder pressure falls below 150- to 200-lb. per sq. in. the first-stage valve remains fully open, being automatically cut out of the system as a reducing valve, and the second-stage valve and diaphragm only are operative. It is claimed that the regulator will operate with equal efficiency whether the oxygen cylinder is full or nearly empty, and the working pressure will remain constant.

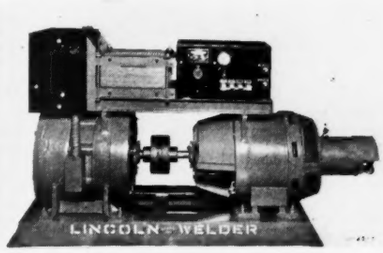
Users of regulators, state the manufacturers, are always cautioned against opening the cylinder valve with the adjusting screw of the oxygen regulator turned in, for this permits the full cylinder pressure to enter the low pressure gage suddenly and might possibly rupture the Bourdon tube or damage the valve, diaphgram, or seat. It is stated that the necessity for this precaution is almost, if not entirely, eliminated in this two-stage regulator, as it is impossible for the full cylinder pressure to enter the low pressure gage. The first-stage valve is of sturdy design so as to withstand severe impact.

Oxygen regulator for reducing pressure to working requirements

Large Size Welder

THE Lincoln Electric Co., Cleveland, Ohio, has added to its line of "Stable-Arc" welders a new welder with a rating of 600 amperes, for use where higher welding current is needed for large size metallic and carbon electrodes.

The new welder may be had in either the portable truck type or stationary truck type. It is a motor-driven, single-operator, variable-voltage machine, and has a current range of from 180 to 750 amperes. Motor and generator are direct-connected, and the working mechanism of all controls are contained in a ventilated enclosed steel cabinet with hand regulators and switches mounted on a panel which forms a side of the cabinet. The control panel contains rheostat, diverter switch, safety starter switch, volt-ammeter and wing nut terminals for cables, this unified control greatly increasing the simplicity of operation, it is claimed.



New welder for use with large size metallic and carbon electrodes

The control cabinet is mounted directly over the motor generator for easy access by the welding operator, also permitting the removal of the motor generator armature without disturbing any other parts.

The use of a combined voltmeter and ammeter, known as a volt-ammeter, makes possible the reading of amount of voltage and amperage on one dial and eliminates the use of the separate delicate ammeter which would be given excessive wear on the welder, due to the large output keeping the ammeter jammed against the high limit pin on the dial. The face of the volt-ammeter is mounted flush with the control panel to assure protection.

Terminals for the lead cables are equipped with winged nuts, which feature, it is claimed, makes quick and easy connections possible, especially when it is desired to reverse the polarity of welding current, and the use of these wing nut terminals also eliminates the necessity of a switch for reversing polarity.

Clamp-Type Electrode Holder

AS A SUPPLEMENT to its line of electric arc welding equipment, the General Electric Co. announces a clamp type electrode holder. This device has jaws of heavy copper alloy, notched to hold firmly any size of electrode wire from $\frac{1}{16}$ to $\frac{1}{4}$ in. in diam., in any position.

A molded compound handle protects the operator from heat and from contact with current-carrying parts. The holder is designed for use with currents up to 300 amp. It may be obtained, if desired, assembled with 5 ft. of extra-flexible cable and terminal.

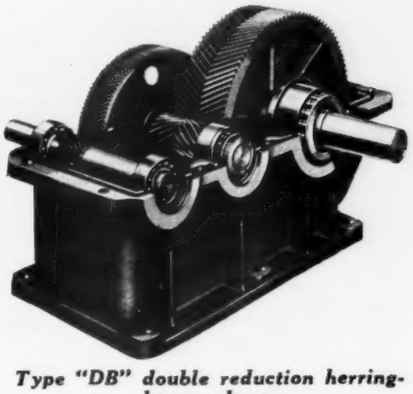
Gas-Electric Locomotive with Combination Throttle and Motor Control

A NEW LINE of gas-electric locomotives has recently been developed by the Vulcan Iron Works, Wilkes-Barre, Penn.

The locomotive is provided with a combination throttle and motor control. The controller has two handles—the speed handle controls the electro-magnetic switches, operates the engine throttle, regulates the generator field excitation, and the starting, accelerating and the speed of the locomotive, and a separate reverser handle is provided for connecting the motors in series or parallel positions, and for "reverse" or "forward" directions. Movement of the speed handle from the "off" to the "pump" position speeds up the engine for operating the air compressor without running the locomotive.

Compactly built, the locomotive is 13 ft. 6 in. long over the bumpers, 7 ft. wide and 8 ft. high. According to the descriptive data furnished by the manufacturers, it has cast-steel, bar type frames, steel-tired wheels 30 in. in diameter, steel plate bumpers, cast-steel, single-pocket coupler with spring draft gear, semi-elliptic springs, cross equalized, four steel sand boxes equipped with air sanders, brakes applied through Westinghouse Air Brake Co. equipment and auxiliary hand lever, steel cab with double glass windows, and an exhaust heater furnished specially for use in cold climates. It is claimed that under dynamometer tests the locomotive developed a draw-bar pull on a dry, well-sanded rail of 8000 lb. at a speed of about 3 miles per hour, and that it has a maximum speed of between 18 to 20 miles per hour.

In the 4-wheel type the locomotives are furnished in sizes from 10-ton to 40-ton, and in the 8-wheel from 20-ton to 80-ton in all standard gages. The one illustrated here is a 12-ton narrow-gage locomotive powered with a 120-hp. Buda 6-cylinder gasoline engine, direct-connected to a 250-volt, direct-current, shunt-wound generator for furnishing electric energy to two Westinghouse mine haulage motors geared to the axles.



Type "DB" double reduction herringbone reducer

A 12-ton locomotive with combination throttle and motor control

Dump Cars and Grading Equipment

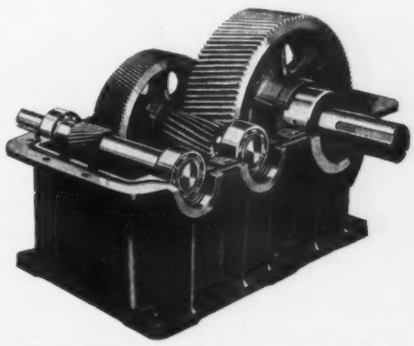
A NEW AND pictorial general catalog, No. 80, which is exceptionally attractive in form and interesting in contents, has just been issued by Western Wheeled Scraper Co. of Aurora, Ill.

The catalog, in its 144 pages, pictures and describes a very extensive line of grading tools and machines, giving special prominence to Western dump cars, which are built in all practical sizes, both in the drop-door and lift-door types.

A copy will be sent to any plant executive on request.

New Line of Speed Reducers

A NEW LINE of speed reducers, designated as the IXL "Titans," has recently been placed on the market by Foote Bros. Gear and Machine Co., Chicago, Ill.



Type "DX" double reduction helical reducer

The new reducers are available with either herringbone or helical gears, in both single and double reduction types, those with herringbone gears being designated as Types "SB" and "DB" and the helical as "SX" and "DX." The herringbone and helical reducers are identical in design with the exception that in one case the gears are of the herringbone type and in the other helical type, with slight bearing modifications.

News of All the Industry

Incorporations

Mineral Products Co., Jacksonville, Fla. S. B. Jennings, Barnett Bldg., Jacksonville.

Keystone Ocher and Clay Co., $106,000. To engage in quarrying and mining.

John Clark Co., Wilmington, Del., $200,000 and 7500 shares common stock. To produce sand and gravel and quarry stone.

City Sand and Gravel Corp., New York City, 1000 shares common. J. A. Byrne, 551 Fifth Ave., Manhattan, New York City.

Missouri Rock Asphalt Co., Kansas City, Mo., $50,000. Wm. Hicks, 2814 Prospect Ave., Kansas City.

Associated Block and Tile Corp., $100,000. To quarry limestone and produce cement, lime, and cement products.

National Quarry and Stone Co., Buncombe, Ill., $10,000 preferred and $10,000 common. Calvin Mathis, Edward H. Reuter and Robert A. Kean.

Forreston Gravel Co., 7836 Colfax Ave., Chicago, Ill., $100,000 common. George C. Hartong, Roscoe C. Nash and Adelaide Hartong.

Marshalltown Sand and Material Co., Marshalltown, Ia., $50,000. President, Fred Miller, Sioux City, Ia., and secretary, E. H. Lowderbaugh, Des Moines, Ia.

A. Courchesne, Inc., El Paso, Tex., $100,000. To produce and sell crushed rock and building materials. A. Courchesne, Thomas A. Courchesne and Madeline Courchesne.

Iowa Concrete Products Co., Des Moines, Ia., $30,000. L. D. Bailey, Elk River, Minn., president; F. W. Screiber, Des Moines, vice-president and general manager, and D. W. Longfellow, secretary.

Quarries

Herzog Lime and Stone Co.'s plant at Patterson, Ohio, has increased its working hours from 10 to 12, to take care of orders received, most of which are for stone for highway work.

Welch, W. Va. Four prisoners working at the city rock quarry here escaped into the mountains and are being sought by the police. While one of them covered the guard with a pistol the others unlocked their leg irons and fled.

Canada Crushed Stone Corp., Ltd., recently installed considerable new machinery for mixing graded stone in special combinations for road work at its Dundas, Ont., plant. The company also has under consideration the installation of a new washing plant.

Tobin Rock Co. has opened a rock quarry northwest of Wathena, Kan., to furnish stone for the Massman Construction Co., which has contract for the Missouri river work on the Kansas side, south of Wathena. The quarry will produce about 500 cu. yd. of rock a day.

Redgranite and Lohrville, Wis. Quarry operators in this locality are now employing large forces of men to meet the demand for blocks, breakwater stone and crushed granite. It is the general belief here that the passage of the traction ordinance at Chicago, Ill., will greatly stimulate the granite industry in this territory. It is estimated that approximately 500 miles of track will be relaid by the traction company starting next year, which will mean a vast amount of street paving.

John T. Dyer Quarry Co., Norristown, Penn., is conducting an outstanding direct-by-mail advertising campaign to direct attention to its Birdsboro trap rock. The latest mailing piece is very attractively done in red and black, illustrating the roadways and grounds at the famous du Pont estate at Kennett Square, Penn., in which Birdsboro trap rock was used as the primary material. The advertising material being circulated by this company is very convincing and undoubtedly is getting results.

American Crushed Rock Co., Marion, Ohio, on July 24 filed a complaint against the Columbus, Delaware and Marion Electric Co. with the Ohio public utilities commission at Columbus, Ohio. According to the crushed rock company, the electric company is charging $1.25 a month for each kilowatt for a ready-to-serve current, the rate being based on a working schedule of 26 days or more per month. Because of a slump in the crushed rock company's business, it is claimed in the complaint, that the plant is able to operate only from 9 to 15 days a month, and it feels that the $1.25 a kilowatt charge is too high.

Douds Stone Co., Douds, Ia., recently entered a five-year contract with the Rock Island railroad to furnish a minimum of 52,000 tons of stone per year. The contract will necessitate doubling the capacity of the quarry and the installation of new equipment, a considerable part of which is already on the grounds. The output of the plant has been averaging around five or six cars daily, and under the new contract must be at least ten cars daily. Aside from the Rock Island contract on which the company must supply 1000 tons of rip-rap weekly, there is also a large demand for crushed stone for road paving in this locality. The company's plant is located adjacent to the Rock Island track, about one mile east of Douds. H. E. Millen is secretary and manager.

Sand and Gravel

Richmond Sand and Gravel Co., Erie, Penn., is building a plant at Fairview, Penn., on the N. P. R. R.

Owosso, Mich. A gravel plant, with a capacity of between 300 and 600 cu. yd. daily, is nearing completion on the farm of George Bock just west of Owosso. Don King is manager.

Central Bridge and Construction Co., Wahoo, Neb., has purchased the sand and gravel rights of the tract of land owned by A. J. Ladenburger near Morse Bluff, Neb., and will begin at once to operate the pit.

Northeast Missouri Sand and Gravel Co., New London, Mo., is operating two shifts of workmen in order to keep up with orders. The company reports that during the month of June it shipped 250 cars of gravel and 120 cars of sand, making a total of 370 cars leaving the pit during the month, and it is expected that July will equal if not surpass the June record.

The Empire Sand and Gravel Co., Marshalltown, Ia., is preparing to open a new plant at Bromley on a 60-acre tract of land recently purchased. The company already operates a plant at Keller, Ia., which it will continue to operate, but the new plant will run on a larger scale. According to W. S. Keller, president of the company, gravel will be taken this year from the new site for road work, but the plant will not be in capacity production until next spring, at which time between 35 and 40 carloads of gravel will be produced daily.

Cement

Beaver Portland Cement Co., Gold Hill, Ore., has completed repairs at its plant at Gold Hill and limestone quarry at Marble Mountain, and both are ready to resume operations. They closed down June 1 when a big slide of overburden at the quarry cut off the supply of limestone for the local plant.

Lone Star Cement Co. Louisiana, New Orleans, La., has placed a contract with the Virginia Bridge and Iron Co. for 40 tons of structural steel to be used in the erection of housing for another kiln at its plant near New Orleans. The kiln is to be moved from the North Birmingham plant of the Lone Star Cement Co. Alabama.

Southwestern Portland Cement Co.'s employes at the Osborn, Ohio, plant succeeded in extinguishing a fire on the plant premises on July 18 which threatened to assume dangerous proportions and reach the plant buildings. The fire started in the grass and weeds on the grounds and was caused by the sparks from a steam shovel. After working for five hours under a blazing sun the men finally subdued the conflagration.

Gypsum

Gustave Adolph New, Port Clinton, Ohio, on July 19 was granted a patent for a cellular gypsum product. He had waited over two years for action on his application, which was filed December 27, 1927, and was allowed eight claims for new ideas. The patent has been assigned to the American Gypsum Co., Port Clinton.

E. D. Coddington's new $20,000 addition to its gypsum products plant at North Milwaukee, Wis., has been completed and the added facilities will enable the company to manufacture all kinds of plaster. The addition is located immediately north of the old building at 5024 37th St. and will be used as a mixing unit.

The Standard Gypsum Co.'s freight steamer "S. A. Perkins" arrived at Long Beach, Calif., July 7, from San Marcos Island, Mexico, and after discharging its cargo of gypsum at the company's Long Beach terminal was surveyed for damage. In a fog off the coast of Lower California the ship collided with the Norwegian motorliner "Villanger" of the Westfal-Larsen line, both ships, however, escaping serious damage in the crash.

Agricultural Limestone

Columbus Junction, Ia. Two carloads of agricultural limestone, presented by the Linwood Cement Co., Davenport, Ia., and Dolese Bros. plant at Buffalo, Ia., are to be given away to Louisa county farmers on August 6 at the Farm Bureau picnic and "Play Day" at Columbus Chautauqua Park, Columbus Junction. The value of the limestone donated by the two companies is about $70.

Carbon Limestone Co., Youngstown, Ohio, entertained over 100 farm agents from western Pennsylvania and eastern Ohio at its plant. F. O. Earnshaw, general manager of the company, and Joseph H. Jackson, superintendent, were in charge of the program, which included a specially conducted tour through the plant and quarry, giving the visitors an opportunity to see the company's agricultural limestone plant in operation. A barbecue dinner was also a part of the entertainment.

Cement Products

The Concrete Products and Roofing Co., Birmingham, Ala., has taken over the meter box business of the Art Concrete Works for the state of Florida and is operating a plant at Jacksonville, Fla. Plants at Birmingham, Ala., and Houston, Tex., were taken over by the company last year.

The Shearman Concrete Pipe Co., Knoxville, Tenn., has purchased a 10-acre tract of land at Chattanooga, Tenn., and it is expected that work on the erection of a new plant will be started within the next 30 days. At present the company operates a Chattanooga branch in a building under lease at 1816 Carter St. J. G. Kyle is superintendent of the Chattanooga branch.

Miscellaneous Rock Products

Superior Earth Co., Ocala, Fla., is to erect a four-story fuller's earth plant at a cost of approximately $80,000. Allis-Chalmers Co., Milwaukee, Wis., will furnish a considerable part of the equipment. James H. Gardner, Tulsa, Okla., is president and Hal Scott is general manager.

Lone Pine, Calif. Archibald Clapp and Irving Monroe have a small crew of men at work developing a talc mine situated near the property of the Sierra Talc Co. The mine was located by Y. C. Ruiz, who is reported to have received an attractive price for the property.

Personals

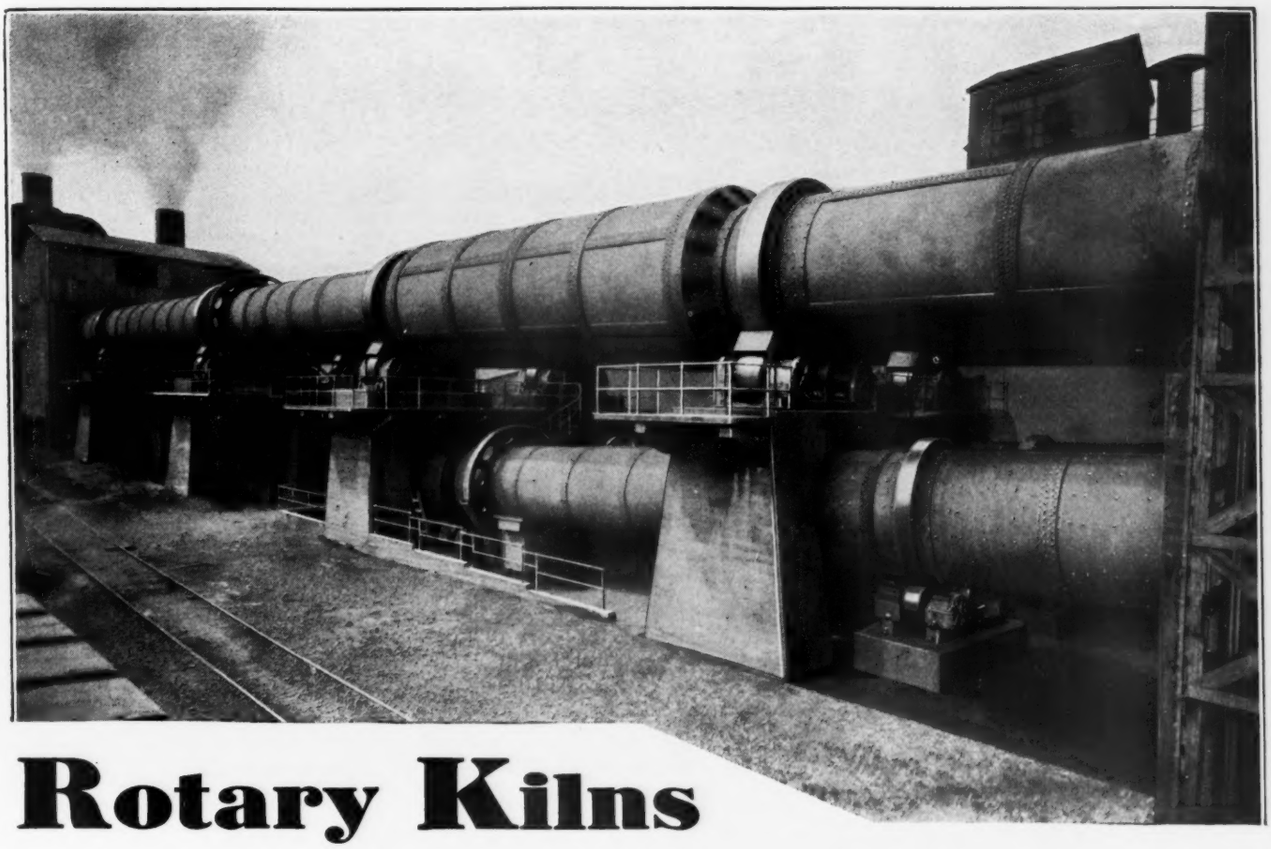
E. C. Wilson, formerly in charge of the pricing group of the gear and reducer division of Foote Bros. Gear and Machine Co., Chicago, Ill., has recently been appointed assistant sales manager. Mr. Wilson was until 1929 assistant sales manager of the R. D. Nuttall Co. of Pittburgh, Penn.

Charles Warner, president of the Warner Co., Philadelphia, Penn., has been chosen one of the members of the executive committee of the Philadelphia Building Congress, organized to aid the construction industries in the metropolitan Philadelphia area.

Charles E. Grubb, formerly county engineer for New Castle county, Delaware, and past president of the County Highway Officials' Division, has been appointed engineer-executive of the County Highway Officials' Division of the American Road Builders' Association.

Francis A. Emmons, vice-president of Foote Bros. Gear and Machine Co., Chicago, Ill., recently returned from a business trip to the West Coast. During the trip Mr. Emmons contacted company representatives at Denver, Salt Lake City, Los Angeles, San Francisco, Portland and Seattle, and reports a general optimistic feeling for business outlook for the latter part of 1930.

A. H. Clark of Jackson, Mich., has become associated with the Mutual Materials Co., Seattle, Wash., as superintendent of the brick and sand



Rotary Kilns
of high efficiency

11′ 6″ x 250′ Four Support Rotary Kiln with Enlarged Calcination Zone and 9′ x 90′ Rotary Cooler.

Cement Mills designed by Allis-Chalmers and equipped with Allis-Chalmers machinery are noted the world over for high efficiency. This is the result of many years experience in designing and building heavy machinery and a policy of continuous research in machinery design.

Rotary Kilns with enlarged Calcination Zones were first built in the United States by the Allis-Chalmers Mfg. Co. This kiln construction has resulted in better heat transference with consequent fuel economy and increased capacity. Allis-Chalmers kilns are of rugged construction with shell plates planed on the edges before rolling, thus insuring a true running shell; bearing pressures are low; riding rings are of the floating type, the latest design kilns having supporting mechanisms of the two roller type with self oiling bearings; thrust rollers have self oiling bearings and are designed to carry the full thrust of the kiln. Driving mechanisms are self contained with motor mounted on a common base. Gears and bearings are self oiling and enclosed. Allis-Chalmers kilns give high operating efficiency.

Allis-Chalmers builds all the principal machinery for cement, crushing, screening, and washing plants, including power and electrical equipment, motors, centrifugal pumps, Texrope Drives, etc.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

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departments. Mr. Clark has been engaged in the manufacture of sandstone brick in the Middle West for the last five years. The plant of the Mutual Materials Co. has a daily capacity of 30,000 sandstone brick and is said to be the only plant of its kind in this territory.

George W. W. Cornman, treasurer and manager of the service department of The Brown Instrument Co., Philadelphia, Penn., will retire from business on August 8. Mr. Cornman has been associated with the instrument business for 35 years, formerly being secretary and treasurer of the Keystone Electrical Instrument Co. When that organization was absorbed by The Brown Instrument Co. he became treasurer and a director of the present organization. The service department will now be in charge of R. C. Kennan as manager, and E. T. Nahill as field supervisor.

Charles B. Spicer, resident manager of the St. Louis office of the Hercules Powder Co., has retired after 43 years of continuous service in the explosives business. Mr. Spicer was born in St. Louis in 1869, and received his education there. He entered the explosives business in 1887 as office boy for the Hazard Powder Co., subsequently rising to the position of salesman for the company. He later became an explosives sales agent at Pittsburg, Kan., and in 1913 he became manager of the Pittsburg office for the Hercules Powder Co. He occupied this position until 1921, when he was transferred to his home town as resident manager in charge of the southwestern district. Active in civic affairs, he is a past-president of the Pittsburg, Kan., Chamber of Commerce. He also officiated as Exalted Ruler of Elks, No. 412. Mr. Spicer's address is 742 Boland Drive, St. Louis, according to Hercules Powder Co. officials.

Obituaries

M. G. Matson, auditor of Swigert, Hart and Yett, Portland, Ore., died July 18 at Emanuel hospital, Portland, following a major operation. Mr. Matson had been auditor for the company ever since it was incorporated and was well known in the building material field in this district.

Benjamin H. Heyward, 70, president of the Winnsboro Granite Corp., was killed in the Anderson, S. C., quarry of the corporation near Rion on July 18 when a chain on a derrick snapped and a mass of granite was precipitated in the quarry below. Mr. Heyward was caught under the falling mass and badly crushed, dying instantly. He had operated the Winnsboro granite quarry for the past 30 years.

Manufacturers

General Refractories Co., Pittsburgh, Penn., has opened a new district sales office in Birmingham, Ala. The office is located in the Empire Bldg. and is in charge of Walter S. Stapler.

E. D. Bullard Co., San Francisco, Calif., announces the establishment of a Chicago office at 224-230 West Huron St., Chicago, Ill., in charge of G. M. Glidden. This is the sixth office of the company and the second to be opened within the past year.

Chain Belt Co., Milwaukee, Wis., announces that the Equipment Corp. of Arizona, Phoenix, Ariz.; F. C. Crane Co., Dallas, Tex.; Joe C. Tucker of Morganfield, Ky.; Track-Type Tractor and Equipment Co. of Amarillo, Tex., and Concrete Products Co. of Oakland, Calif., will handle the company's complete line of Rex construction equipment. In addition to these new construction equipment distributors, the company has appointed E. C. Atkins and Co., Inc., Memphis, Tenn., as chain and power transmission representatives. The Atlanta office of the company has recently been moved to 407-408 Bona Allen Bldg., Atlanta, Ga.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., announces that the sales control of its Model U industrial tractor and allied equipment, formerly sold through the United Tractor and Equipment Corp., has been transferred to the company's Monarch Tractors Division at Springfield, Ill. R. W. Gotshall, Springfield works sales manager, and W. Ellzey Brown will have charge of the new industrial line. Addition of the Model U line will give the Monarch organization both wheel type and crawler type tractors, and Monarch distributors and dealers will also have both types of tractors available, together with allied equipment.

Wire Reinforcement Institute has been established by manufacturers of welded wire fabric reinforcement with headquarters in the National Press Bldg., Washington, D. C. The purpose of the institute is to "provide a centralized organization to exploit the technical and utilitarian merits of wire as used for concrete reinforcement, its activities including the assembly and dissemination of authentic information, data and statistics relevant to welded wire fabric and its uses." The activities of the institute will be conducted under the direction of Royall D. Bradbury, formerly instructor in structural design at the Massachusetts Institute of Technology.

General Electric Co., Schenectady, N. Y. More than 75% of the eligible employes of the company have voted to participate in the new employes' unemployment plan. In proposing to the workers this plan, under which the money will be raised by equal contributions from the employes and the company, it was stated that the plan would become effective upon an affirmative vote of 60% of those eligible at each works. The following works have already voted to participate by a majority exceeding 60%, and it is reported that the number of participants is still increasing—Schenectady, 63%; Lynn, 84%; Pittsfield, 67%; Bridgeport, 92%; Bloomfield, 87%; Philadelphia, 73%; Fort Wayne, 73%, and West Lynn, 73%.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Concrete Products Machinery. No. 6 of "Consolidated Contact," an interesting little journal containing news items of interest to concrete products manufacturers. CONSOLIDATED CONCRETE MACHINERY CORP., Adrian, Mich.

Hammer Drills. Bulletin **87-C,** covering the new Sullivan "L-8" 39-lb. rotator hammer drill for general rock excavation purposes in mines, quarries, and on construction work. SULLIVAN MACHINERY CO., Chicago, Ill.

Centrifugal Lubricator. The principle of operation, complete description and illustration of the Texaco centrifugal lubricator for Raymond roller mills is given in a new circular issued by THE TEXAS CO., New York City.

Blowers. An interesting and helpful booklet giving pointers for improved gas producer operation and describing the Wing turbine blower, which, it is claimed, eliminates excess steam by means of independent control of steam and air admission. L. J. WING MANUFACTURING CO., New York City.

Tractors. A 30-page illustrated booklet on the new Monarch "35" tractor, containing a brief but complete description of the machine, including mechanical features and performance. The booklet is illustrated with approximately 50 photographs to help make it easy reading. ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis.

Concrete Products Machinery. Folder describing the Bewley Duplex cast iron and steel machine for making concrete flower pots in sizes from 2-in. to 12-in. diameter. PORTLAND CONCRETE MACHINES CO., 53 West Jackson Blvd., Chicago, Ill.

Power Shovels. Folder on new electrically operated shovel, employing gasoline for fuel, consisting of a standard Marion shovel chassis in which is incorporated a simplified arrangement of units. THE MARION STEAM SHOVEL CO., Marion, Ohio.

Economizers. New catalog illustrating and describing the C-E Fin-Tube Economizer, with such advantages as less space required, fewer return bend joints, high rate of heat transfer, low water pressure drop, and ease of accessibility for cleaning and inspection. COMBUSTION ENGINEERING CORP., New York City.

Welding. Two new pamphlets—one, "Outline Training Course for Aircraft Welders," containing instructions for aircraft welders based on procedure control, and another, entitled "Production Welding," illustrating and describing the application of the oxy-acetylene process as a production method in a number of industries. LINDE AIR PRODUCTS CO., New York City.

Underground Shovels. Bulletin **No. 40-B** illustrating and describing the Nordberg-Butler underground shovel designed primarily for working in narrow and restricted places to replace slow and expensive hand shoveling of broken and blasted material. Particularly adapted for tunneling and mine drifting, but equally valuable in stopes and on sill floors. NORDBERG MANUFACTURING CO., Milwaukee, Wis.

Heat Treatment of Steel. Catalog **No. 90,** new edition of "The Hump Method for Heat Treatment of Steel," containing chapters on principles and practice of this method, changing internal steel structure, ideal conditions for correct hardening, automatic control of rate of heating, advantages of Hump method and a comparative record of results and applications. LEEDS AND NORTHRUP CO., 4901 Stenton Ave., Philadelphia, Penn.

Water Stopers. Bulletin **No. 87-E** describing the Sullivan Class "S-2" self-rotating water stoper for heavy stoping work and hard rock conditions, which, it is claimed, will satisfy requirements of wet stoper duty under the most severe service. Illustrated with photographs, and tables giving sizes, weights and other data on drill steel for "S-2" stopers, special chuck bushings and chucks, and hand tools available for sharpening steels for the stoper. SULLIVAN MACHINERY CO., 400 North Michigan Ave., Chicago, Ill.

Material Handling Equipment. A new catalog describing Cedar Rapids crushers in eight sizes; the Cedar Rapids "one-piece outfit," a portable gravel plant which crushes, screens and loads in one operation; a portable washing plant, consisting of 40-yd. steel compartment bin, revolving screen, scrubber and power; two-wheel trucks for industrial power units; portable sized stone plant, furnished in seven sizes and used for the reduction of quarry rock; screening and loading plants; storage and loading bins; belt conveyors; bucket elevators, and other material-handling equipment. IOWA MANUFACTURING CO., Cedar Rapids, Ia.

G-E Bulletins. GEA-823C illustrating and describing atomic-hydrogen arc-welding equipment for hand-welding on 50- and 60-cycle circuits only. **GEA-754A** on semi-automatic reduced-voltage starters for synchronous motors, describing the CR1135-A2 low-voltage starter and the CR1135-C2 high-voltage starter. **GEA-1265A** giving a description and the application of the CR2992-A1 thermostat for use with industrial heating units where very close control is not required. **GEA-1052A** on "7500 Series" general-purpose synchronous motors, Type TS, 3-phase, and Type QS, 2-phase. **GEA-708A** on the "7600 Series" general-purpose synchronous motors, Type TS, 3-phase, and QS, 2-phase, adapted for general-purpose application and, according to the description, suitable for loads whose torque requirements can be successfully met by a standard squirrel-cage induction motor. **GEA-579A** on automatic full-voltage controllers for synchronous motors, covering CR7065-H3 low-voltage starters and CR7065-M3 and -M4 high-voltage starters, recommended as starting equipment for low-speed synchronous motors driving compressors, pumps and similar machines. **GEA-785-B** on air-drawing oven, Type AD, for drawing carbon steel at temperatures up to 750 deg. F. **GEA-1266** on the CR7505-A1 photo-electric relay, used to control an electric circuit in response to an increase or decrease in the amount of light falling on the photo-electric tube. **GEA-1262** on CR9504 operators, described as a self-contained, hydraulic device which will exert a smooth, straight-line thrust in one direction throughout a definite distance. **GEA-722B** on the Selsyns devices for remote signaling, control and indication. GENERAL ELECTRIC CO., Schenectady, N. Y.

South African Cement Trade

SOUTH AFRICA has six establishments turning out cement, according to a special report from the Bureau of Foreign and Domestic Commerce. Five plants are owned or controlled by the Pretoria Portland Cement Co. of South Africa and are the Hercules plant at Pretoria, output about 46,000 bbl. per month; a slurry plant, the only wet process operation in the country, near the junction of the Orange Free State, Cape Colony and Rhodesian railways, 101,596 bbl. per month; Cape Portland Cement Co., De Hoek, 105 miles from Capetown, 35,558 bbl. per month; Eastern Province Cement Co. near Port Elizabeth, 25,399 bbl., and the Premier Cement Factory at Bulawayo, output not known.

The White Portland Cement Co., between Kroonstad and Bloemfontein, a subsidiary of the company by the same name in England, has an output of between 400,000 to 470,000 bbl. per year. In the Belgian Congo district is the Ciments Du Katanga, at Lubudi, with an output of 160,000 bbl. of portland cement and 23,450 bbl. of liquid cement.

As there is an abundance of limestone, shale and coal, raw material is not imported. Several countries, notably Belgium, can manufacture cement and land it at coast towns for less than the local cement can be placed on the market. The import trade is confined to coastal areas, however. Practically all import is in casks and retails at $3.04 to $3.28 per cask of 375 lb. net. Throughout South Africa wholesale prices depend on tonnage bought and mileage. Prices are $1.82 to $2.06 per 188-lb. bag.